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DEPARTMENT OF REGISTRATION AND EDUCATION
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DIVISION OF THE
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URBANA

REPORT OF INVESTIGATIONS — No. 88

CHEMICAL CHARACTERISTICS OF ILLINOIS CRUDE OILS WITH A DISCUSSION OF THEIR GEOLOGIC OCCURRENCE

BY

O. W. REES, P. W. HENLINE, AND A. H. BELL

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1943

ILLINOIS STATE GEOLOGICAL SURVEY
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Topographic Mapping in Cooperation with the United States Geological Survey.
This Report is a Contribution of the Analytical Division.

May 20, 1943

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CHEMICAL CHARACTERISTICS OF ILLINOIS CRUDE OILS WITH A DISCUSSION OF THEIR GEOLOGIC OCCURRENCE

BY

O. W. Rees, P. W. Henline, and A. H. Bell

Through the discovery and development of new fields, the annual production of crude oil in Illinois has increased rapidly in the last few years until in 1940 it reached approximately 147,647,000 barrels or nearly four and one-half times the 1908 peak of 33,686,000 barrels. In 1942 Illinois produced 106,590,000 barrels of crude oil. With this production Illinois ranked fifth as a major petroleum-producing state. As the petroleum industry is of such importance in this State, and as the war has created an urgent demand for crude oils especially suited for the production of high-octane gasoline, toluene, and synthetic rubber, this report has been prepared which deals rather comprehensively with the chemical characteristics of Illinois crude oils, together with a discussion of their geologic occurrence.

GEOLOGIC OCCURRENCE

All of the oil so far produced in Illinois is from rocks of Paleozoic age. In the order of descending amount of total production the oil-producing strata are in the following systems, first Mississippian, second Pennsylvanian, third Devonian, and fourth Ordovician. In the old fields of Illinois, Pennsylvanian sandstones produced more than half of the oil, whereas in the new fields Mississippian sandstones and limestones are far in the lead. The Ordovician system has been of minor importance in both old and new fields. Devonian limestone was of minor importance in the old fields but has yielded substantial quantities of oil in some new fields. Table 1 shows the geologic column for southern Illinois, and Table 2 lists the oil- and gas-producing strata in Illinois. Figure 6 is a map of the oil and gas fields of Illinois showing old and new fields.

METHODS OF ANALYSIS

Most of the data presented herein are based on analyses made in the University of Illinois analytical laboratory and the State Geological Survey laboratories. For the most part these analyses were made according to standard procedures of the American Society for Testing Materials *(1)** and the U. S. Bureau of Mines *(2)*. In this connection a brief discussion of tests commonly made on petroleum and the significance of these tests seem appropriate.

1. *Specific gravity.*—Specific gravity of petroleum may be determined by the use of hydrometers, picnometers, or the Westphal balance. The last is commonly used in this laboratory. Values are ordinarily reported in terms of A. P. I. gravity, the lower values indicating heavier crude oils containing a preponderance of higher boiling, higher molecular weight compounds, while the higher values indicate lighter crude oils containing a preponderance of lower boiling, lower molecular weight compounds. The specific gravity value gives information on the general character of the crude oil.

2. *Viscosity.*—Viscosity of petroleum may be determined by several different

* Italic numbers in parentheses refer to bibliography, p. 24.

TABLE 1.—GEOLOGIC COLUMN FOR SOUTHERN ILLINOIS

System or Series	Group or Formation, and Lithology*
Pleistocene	Glacial drift and loess
Pliocene	Chert gravel
Eocene	Sand and clay } Southern tip of State
Cretaceous	Sand and clay }
Pennsylvanian	McLeansboro group — sh., ss., thin ls., and coal Carbondale group — sh., ls., ss., coal Tradewater group — ss., sh., and thin coal Caseyville group — ss., sh., and thin coal
Chester (Upper Mississippian) series	Kinkaid — ls., sh. Degonia — ss. Clore — ls., sh. Palestine — ss. Menard — ls., sh. Waltersburg — ss. Vienna — ls., sh. Tar Springs — ss. Glen Dean — ls., sh. Hardinsburg — ss. Golconda — ls., sh. Cypress — ss. Paint Creek — ls., sh. Bethel — ss. Renault — ls., sh., ss. Aux Vases — ss.
Iowa (Lower Mississippian) series	Ste. Genevieve — ls. { Levias — ls. / Rosiclare—ss. / Fredonia — ls. St. Louis — ls. Salem — ls. Warsaw — ls. } Osage group Keokuk — ls. } Burlington — ls. } Fern Glen — ls. } Kinderhook — sh., ls., ss.
Mississippian and Devonian	Chattanooga — New Albany sh.
Devonian	Limestone } (formations undifferentiated)
Silurian	Dolomite }
Ordovician	Maquoketa—sh. Kimmswick — ls. Plattin — ls. Joachim — ls. St. Peter — ss.
Pre-St. Peter	Unidentified

*ls.—limestone; ss.—sandstone; sh.—shale

TABLE 2.—OIL AND GAS PRODUCING STRATA IN ILLINOIS

System or Series	Group or Formation	Producing Strata°	Pool	County	Approximate depth, feet
Pennsylvanian system	McLeansboro group	Upper Siggins gas	Siggins	Cumberland, Clark	370
	Carbondale group	Bellair 500	Bellair	Crawford, Jasper	560
		Casey	Casey	Clark	450
		Dykstra	Junction City	Marion	510
		Wilson	"	"	610
		Claypool	North Johnson	Clark	420
		Lower Siggins	Siggins	Cumberland, Clark	560
		Upper Partlow	South Johnson	Clark	490
	Tradewater and Caseyville groups	Bridgeport	Albion	Edwards	1570
		Biehl and Jordan	Allendale	Wabash	1450
		Bellair 800	Bellair	Crawford, Jasper	800
		Pennsylvanian	Carlinville*	Macoupin	380
		"	Carlinville North	"	435
		"	Gillespie-Benld gas*	"	540
		"	Gillespie-Wyen	"	670
		"	Herald	White	1500
		"	Inman East	Gallatin	780
		"	Jacksonville gas*	Morgan	250
		Biehl	Keensburg Consol.	Wabash	1740
		Bridgeport	Lawrence	Lawrence	900-950
		Buchanan	"	"	1250
		"	Lawrence South	"	1370
		Pennsylvanian	Litchfield*	Montgomery	660
		Robinson	Main, Birds, etc.	Crawford	900-1000
		Pennsylvanian	Maunie	White	1315
		"	Maunie South	"	1400
		Biehl	Mt. Carmel	Wabash	1490
		Pennsylvanian	New Bellair	Crawford	1175
		Biehl	New Harmony Consol.	White	1880
		"	Patton	Wabash	1470
		Pennsylvanian	Plainview	Macoupin	400
		"	Raymond	Montgomery	600
		Buchanan	Ruark	Lawrence	1510
		Bridgeport	Russelville gas	"	730
		Buchanan	"	"	1090
		Lower Partlow	South Johnson	Clark	600
		Pennsylvanian	Spanish Needle Creek*	Macoupin	300
		"	Staunton gas*	"	460
		"	Waggoner	Montgomery	610
		Petro	Wamac	Marion, Clinton, Washington	720
		Pennsylvanian	Warrenton-Borton	Edgar	160
		"	Westfield	Clark	290
Chester (Upper Mississippian) series	Degonia ss.	Degonia	Epworth	White	2090
		"	Maunie South	"	1905
		"	Phillipstown	"	2000
	Clore fm.	Clore	Epworth	White	2070
		"	Inman East	Gallatin	1725
		"	Keensburg Consol.	Wabash	1760
		"	Phillipstown	White	2020
	Palestine ss.	Palestine	Epworth	White	2100
		"	Inman	Gallatin	1830
		"	Inman East	"	1840
		"	Keensburg Consol.	Wabash	1830
		"	Maunie	White	2010
		"	Maunie South	"	2020
		"	Mt. Carmel	Wabash	1540
		"	Omaha	Gallatin	1670
		"	Phillipstown	White	2050

° Sandstones unless otherwise noted.
* Abandoned.

Revised November 1, 1942

TABLE 2—OIL AND GAS PRODUCING STRATA IN ILLINOIS—Continued

System or Series	Group or Formation	Producing Strata°	Pool	County	Approximate depth, feet
Chester (Upper Mississippian) series	Waltersburg ss.	Waltersburg	Albion	Edwards	2370
		"	Allendale	Wabash	1540
		"	Inman East	Gallatin	1980
		"	Junction	"	1760
		"	Maud	Wabash	1920
		"	Maunie South	White	2210
		"	New Harmony Consol.	"	2150
		"	New Harmony South	"	2220
		"	Roland	White, Gallatin	2170
		"	Samsville	Edwards	2400
		"	Storms	White	2230
	Tar Springs ss.	Tar Springs	Allendale	Wabash	1610
		"	Ava-Campbell Hill*	Jackson	560
		"	Benton	Franklin	2110
		"	Centerville East	White	2475
		"	Flora	Clay	2320
		"	Herald	White	2260
		"	Inman East	Gallatin	2080
		"	Iron	White	2420
		"	Keensburg Consol.	Wabash	2090
		"	Maunie	White	2190
		"	Maunie South	"	2260
		"	Mt. Carmel West	Wabash	1950
		"	New Harmony Consol.	White	2200
		"	New Harmony South	"	2350
		"	New Haven	"	2110
		"	Omaha	Gallatin	1880
		"	Phillipstown	White	2290
		"	Roland	White, Gallatin	2240
		"	Sailor Springs	Clay	2330
		"	Stokes	White	2295
		"	Storms	"	2300
		"	Walpole	Hamilton	2465
		"	West Frankfort	Franklin	2040
	Hardinsburg ss.	Hardinsburg	Iron	White	2710
		"	New Haven	"	2350
	Golconda ls.	Golconda ls.	St. James	Fayette	1490
	Cypress ss.	Cypress	Akin	Franklin	2840
		"	Allendale	Wabash	1920
		"	Ava-Campbell Hill*	Jackson	780
		Carlyle	Bartelso	Clinton	980
		Bellair 900	Bellair	Crawford, Jasper	890
		Cypress	Bible Grove	Clay	2490
		"	Brown	Marion	1640
		Carlyle	Carlyle	Clinton	1030
		Cypress	Centerville East	White	2915
		Weiler	Centralia	Clinton, Marion	1200
		Weiler	Clay City Consol.	Clay, Wayne	2670
		Cypress	Cowling	Edwards	2620
		"	Dale-Hoodville Consol.	Hamilton	2680
		"	Dundas Consol.	Richland, Jasper	2490
		Weiler	Flora	Clay	2600
		Carlyle	Frogtown*	Clinton	950
		"	Grayville West	White	2870
		Upper Lindley	Greenville gas*	Bond	930
		Weiler	Hoffman	Clinton	1200
		Cypress	Inman East	Gallatin	2430
		Weiler	Inman West	"	2480
		"	Iron	White	2710

° Sandstones unless otherwise noted.
* Abandoned.

Revised November 1, 1942

TABLE 2—OIL AND GAS PRODUCING STRATA IN ILLINOIS—Continued

System or Series	Group or Formation	Producing Strata°	Pool	County	Approximate depth, feet
Chester (Upper Mississippian) series	Cypress ss.	Cypress	Keensburg Consol.	Wabash	2430
		"	Langewisch-Kuester	Marion	1600
		Kirkwood	Lawrence	Lawrence	1400
		Weiler	Louden	Fayette, Effingham	1470
		"	Mattoon	Coles	1830
		"	Mt. Carmel	Wabash	2010
		"	New Harmony Consol.	White	2570
		"	New Haven	"	2450
		"	Noble	Richland	2550
		"	Parkersburg	Edwards	2830
		Cypress	Patoka East	Marion	1350
		"	Posey	Clinton	1100
		Weiler	Roland	White, Gallatin	2570
		Cypress	Rural Hill	Hamilton	2710
		"	St. James	Fayette	1600
		Weiler	Sailor Springs	Clay	2600
		Sparta gas	Sparta*	Randolph	850
		Cypress	Storms	White	2680
		"	Tamaroa	Perry	1130
		Weiler	Woodlawn	Jefferson	1815
	Paint Creek fm.	Stray	Benton North	Franklin	2605
		Paint Creek	New Harmony Consol.	White	2670
		"	Keensburg Consol.	Wabash	2560
		Stray	Louden	Fayette, Effingham	1530
		Paint Creek	Parkersburg	Edwards	2955
		Stray	Patoka East	Marion	1335
		Paint Creek	Roland	White	2750
		"	Stokes	"	2800
		"	Storms	"	2805
	Bethel ss.	Bethel	Albion	Edwards	2900
		"	Allendale	Wabash	2010
		"	Alma	Marion	1930
		"	Beaver Creek	Bond	1115
		"	Benton North	Franklin	2610
		"	Bonpas West	Richland	2930
		"	Boulder	Clinton	1195
		"	Centerville East	White	2960
		Benoist	Centralia	Clinton, Marion	1350
		Bethel	Centralia West	Clinton	1410
		"	Clay City Consol.	Clay, Wayne	2880
		Benoist	Cordes	Washington	1260
		"	Cravat	Jefferson	2070
		Bethel	Dale-Hoodville Consol.	Hamilton	2950
		Benoist	Dix	Jefferson, Marion	1950
		"	Dubois	Washington	1360
		"	Dubois West	"	1345
		"	Elkville	Jackson	2200
		"	Fairman	Marion, Clinton	1430
		Bethel	Flora	Clay	2780
		"	Friendsville	Wabash	2465
		"	Herald	White	2790
		"	Hoffman	Clinton	1320
		"	Iola	Clay	2280
		"	Iron	White	2790
		"	Irvington	Washington	1540
		"	Keensburg Consol.	Wabash	2570
		"	Kenner	Clay	2660
		"	Lakewood	Shelby	1700
		"	Lancaster	Wabash	2535
		Tracey	Lawrence	Lawrence	1560
		Bethel	Lawrence South	Lawrence, Wabash	2015

° Sandstones unless otherwise noted.
* Abandoned.

Revised November 1, 1942

TABLE 2—OIL AND GAS PRODUCING STRATA IN ILLINOIS—Continued

System or Series	Group or Formation	Producing Strata°	Pool	County	Approximate depth, feet
Chester (Upper Mississippian) series	Bethel ss.	Benoist	Louden	Fayette, Effingham	1550
		Bethel	McKinley	Washington	980
		"	Mason South	Effingham	2295
		"	Maud	Wabash	2120
		"	Maunie North	White	2840
		"	Mt. Carmel	Wabash	2100
		"	New Harmony Consol.	White	2710
		Benoist	Patoka	Marion	1420
		"	Patoka East	"	1470
		"	Roland	White, Gallatin	2750
		Bethel	St. Francisville	Lawrence	1840
		"	St. Francisville East	"	1750
		"	St. Paul	Fayette	1880
		Benoist	Salem	Marion	1770
		"	Sandoval	"	1540
		"	Stokes	White	2810
		Bethel	Storms	"	2805
		Benoist	Tonti	Marion	1940
		Bethel	Woburn	Bond	1910
		"	Woodlawn	Jefferson	1910
	Aux Vases ss.	Aux Vases	Aden	Wayne, Hamilton	3190
		"	Albion	Edwards	3040
		"	Albion North	"	3055
		Lower Lindley	Ayers gas	Bond	940
		Aux Vases	Benton North	Franklin	2690
		"	Bible Grove South	Clay	2735
		"	Blairsville	Hamilton	3295
		"	Bungay	"	3270
		"	Carmi North	White	3230
		"	Centerville East	"	3075
		Bradley	Cisne	Wayne	2980
		Aux Vases	Clay City Consol.	Clay, Wayne	2910
		"	Coil	Wayne	2918
		"	Concord	Whlte	2905
		"	Cooks Mills	Coles	1830
		"	Covington	Wayne	3115
		"	Dale-Hoodville Consol.	Hamilton	2970
		"	Dundas Consol.	Jasper, Richland	2700
		"	Fairfield	Wayne	3235
		"	Geff	"	3065
		"	Geff West	"	3130
		"	Goldengate	"	3255
		"	Keensburg Consol.	Wabash	2760
		"	Inman North	Gallatin	2815
		"	Iola***	Clay	2360
		"	Johnsonville	Wayne	2990
		"	Johnsonville South	"	3030
		"	King	Jefferson	2740
		"	Lakewood	Shelby	1720
		"	Mason South	Effingham	2360
		"	Maunie	White	2845
		"	Maunie South	"	2840
		"	Mt. Erie	Wayne	2935
		"	Mill Shoals	White, Hamilton	3220
		"	New Harmony Consol.	White	2840
		"	New Haven	"	2715
		"	Phillipstown	"	2940
		"	Roland	White, Gallatin	2880
		"	Rural Hill	Hamilton	3140
		"	Salem	Marion	1840
		"	Sesser	Franklin	2700
		"	Sims	Wayne	3020

° Sandstones unless otherwise noted.
*** Abandoned; revived 1941.

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TABLE 2—OIL AND GAS PRODUCING STRATA IN ILLINOIS—Continued

System or Series	Group or Formation		Producing Strata°	Pool	County	Approximate depth, feet
Chester (Upper Mississippian) series			Aux Vases	Sims North	Wayne	3030
			"	Stewardson	Shelby	1940
			"	Tonti	Marion	2010
			"	Walpole	Hamilton	3070
			"	West Frankfort	Franklin	2700
			"	Xenia	Clay	2790
Iowa (Lower Mississippian) series	Ste. Genevieve formation	Levias member	Levias ls.	Benton North	Franklin	2710
			"	Bonpas West	Richland	3070
			"	Boos North	Jasper	2780
			"	Boyleston	Wayne	3310
			"	Carmi	White	3150
			"	Centerville East	"	3175
			"	Coil West	Jefferson	2795
			"	Covington	Wayne	3210
			"	Dale-Hoodville Consol.	Hamilton	3000
			"	Dundas East	Jasper	2940
			"	King	Jefferson	2770
			"	Markham City	"	3075
			"	Maunie South	White	2880
			"	Roaches	Jefferson	2160
			"	Rural Hill	Hamilton	3210
			"	Sims	Wayne	3070
		Rosiclare member	Rosiclare	Alma	Marion	2070
			"	Barnhill	Wayne	3340
			"	Benton North	Franklin	2800
			"	Boos North	Jasper	2810
			"	Boyleston	Wayne	3280
			"	Burnt Prairie	White	3260
			"	Cisne	Wayne	3090
			"	Clay City Consol.	Clay, Wayne	2970
			"	Cooks Mills	Coles	1805
			"	Covington	Wayne	3240
			"	Dale-Hoodville Consol.	Hamilton	3050
			"	Dix	Marion	2100
			"	Dundas Consol.	Richland, Jasper	2800
			"	Goldengate	Wayne	3320
			"	Inman	Gallatin	2800
			"	Maud	Wabash	2640
			"	Maunie North	White	3000
			"	Mt. Carmel	Wabash	2360
			"	Mt. Erie	Wayne	3070
			"	Mt. Erie South	"	3255
			"	New Harmony Consol.	White	2910
			"	Patoka	Marion	1550
			"	Patton	Wabash	2220
			"	Phillipstown	White	2960
			"	Roaches	Jefferson	2190
			"	Rural Hill	Hamilton	3160
			"	Salem	Marion	2060
			"	Sims	Wayne	3090
			"	Sims North	"	3150
		Fredonia member	McClosky "lime"	Aden	Wayne, Hamilton	3290
			"	Aden North	Wayne	3310
			"	Albion	Edwards	3110
			"	Allendale	Wabash	2280
			"	Amity	Richland	2960
			"	Barnhill	Wayne	3390
			"	Belle Prairie	Hamilton	3460
			"	Benton North	Franklin	2780
			"	Bible Grove	Clay	2810
			"	Bone Gap	Edwards	3270

° Sandstones unless otherwise noted.

TABLE 2—OIL AND GAS PRODUCING STRATA IN ILLINOIS—Continued

System or Series	Group or Formation		Producing Strata°	Pool	County	Approximate depth, feet
Iowa (Lower Mississippian) series	Ste. Genevieve formation	Fredonia member	McClosky"lime"	Bonpas	Richland	3130
			"	Bonpas West	"	3170
			"	Boos North	Jasper	2800
			"	Boyleston	Wayne	3250
			"	Burnt Prairie	White	3420
			"	Carmi****	"	3150
			"	Centerville	"	3340
			"	Centerville East	"	3215
			"	Cisne	Wayne	3120
			"	Cisne North	"	3170
			"	Clay City Consol.	Clay, Wayne	2980
			"	Clay City West	Clay	3050
			"	Coil West	Jefferson	2845
			"	Covington	Wayne	3240
			"	Dahlgren	Hamilton	3340
			"	Dale-Hoodville Consol.	"	3130
			"	Dundas Consol.	Richland, Jasper	2840
			"	Dundas East	Richland	3000
			"	Eldorado	Saline	2940
			"	Elk Prairie*	Jefferson	2720
			"	Ellery	Edwards, Wayne	3340
			"	Flora	Clay	2970
			"	Goldengate	Wayne	3370
			"	Grayville	Edwards, White	3130
			"	Grayville West	White	3190
			"	Hidalgo	Jasper	2540
			"	Ingraham*	Clay	3100
			"	Inman	Gallatin	2730
			"	Inman East	"	2740
			"	Inman North	"	2870
			"	Iron	White	3050
			"	Johnsonville	Wayne	3100
			"	Johnsonville South	"	3210
			"	Johnsonville West	"	3105
			"	Keensburg Consol.	Wabash	2790
			"	Keensburg East	"	2710
			"	Kell	Jefferson	2625
			"	King	"	2825
			"	Lancaster	Wabash, Lawrence	2670
			"	Lawrence	Lawrence	1700
			"	Leech Twp.	Wayne	3410
			Oblong "sand"	Main	Crawford	1340
			McClosky "lime"	Marcoe*	Jefferson	2750
			"	Markham City	"	3120
			"	Mason	Effingham	2490
			"	Mason South	"	2450
			"	Mattoon	Coles	2000
			"	Maud	Wabash	2650
			"	Maunie North	White	3050
			"	Maunie South	"	2870
			"	Mayberry	Wayne	3380
			"	Mill Shoals	White, Hamilton	3350
			"	Mt. Carmel	Wabash	2370
			"	Mt. Erie	Wayne	3080
			"	Mt. Erie South****	"	3130
			"	New Harmony Consol.	White	2930
			"	New Harmony South	"	3010
			"	New Haven	"	2820
			"	Noble	Richland	2960
			"	Olney	"	3050
			"	Patton	Wabash	2310
			"	Parkersburg	Richland, Edwards	3130

° Sandstones unless otherwise noted.
* Abandoned.
**** Abandoned; revived 1942.

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TABLE 2.—OIL AND GAS PRODUCING STRATA IN ILLINOIS—CONTINUED

System or Series	Group or Formation	Producing Strata°	Pool	County	Approximate depth, feet
Iowa (Lower Mississippian) series	Ste. Genevieve formation, Fredonia member	McClosky "lime"	Phillipstown	White	2960
		"	Rinard*	Wayne	3140
		"	Roaches	Jefferson	2200
		"	Roland	White, Gallatin	3155
		"	Roundprairie	Wayne	3170
		"	Rural Hill	Hamilton	3250
		"	Ste. Marie	Jasper	2830
		"	Sailor Springs	Clay	3050
		"	Sailor Springs South	"	2940
		"	Salem	Marion	1990
		"	Schnell	Richland	3010
		"	Sims	Wayne	3160
		"	Sims North	"	3180
		"	Stokes	White	3080
		"	Stringtown	Richland	3030
		"	Thompsonville	Franklin	3110
		"	Toliver	Clay	2790
		"	Tonti	Marion	2130
		"	Valier	Franklin	2715
		"	Whittington	"	2870
	St. Louis ls.	St. Louis ls.	Ina*	Jefferson	3000
		Martinsville "sand"	Martinsville	Clark	480
		Westfield ls.	Westfield	"	330
		St. Louis ls.	Whittington	Franklin	3060
	Salem ls.	Salem ls.	Barnhill	Wayne	3790
		"	Jacksonville gas*	Morgan	300
		"	Salem	Marion	2180
		Westfield ls.	Westfield	Clark	380
	Osage Group	Carper	Casey	Clark	1280
		"	Martinsville	"	1340
		"	Westfield	"	910
Devonian system		Devonian ls.	Bartelso	Clinton	2420
		"	Boulder	"	2585
		"	Centralia	" , Marion	2860
		Hoing	Colmar-Plymouth	Hancock, McDonough	450
		Devonian ls.	Irvington	Washington	3090
		"	Louden	Fayette, Effingham	3000
		"	McKinley	Washington	2250
		"	Martinsville	Clark	1550
		"	Salem	Marion	3340
		"	Sandoval	"	2920
		"	Sorento	Bond	1800
		"	Tonti	Marion	3490
Dev. Sil.		Devonian-Silurian ls.	Collinsville*	Madison	1300
Silurian system		Silurian ls.	Pittsfield (Pike.Co.) gas*	Pike	270
Ordovician system		"Trenton" ls.	Centralia	Clinton	4020
		"	Dupo	St. Clair	500
		"	Martinsville*	Clark	2680
		"	St. Jacob	Madison	2335
		"	Salem	Marion	4500
		"	Waterloo**	Monroe	410
		"	Westfield	Clark	2260

° Sandstones unless otherwise noted.
* Abandoned.
** Abandoned; revived 1939.

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procedures of which a very common one is the use of the Saybolt viscosimeter. In brief the determination by this procedure consists of determining the time necessary for a measured portion of oil to pass a standard orifice at some designated temperature. The common temperatures used are 70°F. and 100°F. and the results are reported as Saybolt seconds. The Saybolt Universal viscosimeter is commonly used for oils having flow times of more than 32 seconds and less than 1000 seconds, whereas oils having flow times of the order of 1000 seconds and higher are tested by means of the Saybolt Furol viscosimeter. Viscosity values give additional general information on the crude oils, those having high viscosity being made up of the higher boiling heavier compounds and those with lower viscosities containing more lower boiling lighter compounds. This value, together with the A. P. I. gravity value, gives general information on gasoline content and has a direct bearing on pumping and transportation costs of the crude oil.

3. *Carbon residue.*—The carbon residue value is commonly determined in the Conradson carbon residue apparatus. In brief this consists of heating a weighed portion of oil under specified conditions, effecting volatilization of all volatile materials, with subsequent weighing of the residue. This determination is commonly made on the residuum remaining after the fractional distillation of crude oil in routine analysis, and the values are reported both as per cent of residuum and as per cent of total crude oil obtained by calculation. Carbon residue indicates to some extent the amount of asphalt contained in the oil and is a factor indicating its suitability for the production of lubricating oils. Crude oils having low carbon residues, such as the Pennsylvania crude oils, are considered to be superior lubricating oil stock.

4. *Pour point.*—Pour point is determined by chilling a measured portion of oil and determining the temperature at which flow ceases. It provides information to some extent as to how the crude oil will behave in transportation and storage. Oils with pour points higher than 50°F. are likely to cause difficulty by solidifying during the winter in tanks and pipe lines.

5. *Cloud point.*—Cloud point is determined by chilling a portion of oil and determining the temperature at which wax first forms. This test is commonly applied to the lubricating fractions obtained from fractional distillation of the crude oil and gives information as to the distribution of wax in these lubricating fractions. Such information is of importance to the refiner in determining necessary solvent refining in lubricating oil production.

6. *Moisture in petroleum.*—Moisture in petroleum is determined by a special distillation in a suitable apparatus so arranged that the water is condensed and its volume is determined. This simply gives a measure of the percentage of water present in the crude oil and may indicate to some extent the possibility of emulsification during handling.

7. *Sulfur.*—Sulfur in petroleum may be conveniently determined in the oxygen bomb in which a weighed portion of oil is burned in oxygen, whereupon the sulfur is converted to sulfate which may be dissolved in water, precipitated as barium sulfate, and weighed. Knowledge of the sulfur content of a crude oil is important in chemical relationships and refining value, and it is to some extent indicative of the amount of asphalt present in the crude. In refining, the sulfur value is important in determining the treatment necessary to produce gasoline of low-sulfur content.

8. *Fractional distillation.*—Fractional distillations of petroleum are made in various ways. For general studies the Hempel distillation procedure *(2)* gives good information. This is a combination of atmospheric distillation plus low-pressure distillation, the low pressure part of which gives additional information on the higher boiling or lubricating fractions. The fractional distillation gives information on the refining value of the crude oil, that is, it gives a rough survey of the approximate amounts of gasoline, kerosene, gas oil, lubricating stock, and residuum to be expected in refining. Specific gravities of all fractions and

viscosities of lubricating fractions obtained by distillation are usually determined to give further information. This is the most important step in the laboratory evaluation of crude oils. According to the Bureau of Mines *(3)*, using the modified Hempel distillation procedure, the rules for calculating the summary are as follows:

1) "The (sum) total percentage of all fractions distilling at atmospheric pressure below 100° C. (212° F.) is reported as the percentage of light gasoline. This figure approximates the yield of gasoline with a maximum boiling point of 125° C. (257° F.).

2) "The (sum) total percentage of all fractions distilling at atmospheric pressure below 200° C. (392° F.) is reported as the total percentage of gasoline and naphtha if no fraction in this range has a gravity heavier than 0.825 (40° A.P.I.). This figure approximates the yield of gasoline or naphtha with a maximum boiling point of 215° C. (419° F.). (If fractions boiling below 200° C. have gravities heavier than 0.825, they are classed as gas oil.)

3) "The (sum) total percentage of all fractions distilling at atmospheric pressure above 200° C. (392° F.) but below 275° C. (527° F.) that have gravities of 0.825 (40° A.P.I.) or lighter is reported as kerosene distillate.

4) "The (sum) total percentage of all fractions distilling at atmospheric pressure below 275° C. (527° F.) that have gravities heavier than 0.825 (40° A.P.I.) plus all vacuum distillate with a viscosity less than 50 seconds (Saybolt Universal at 100° F.) is reported as gas oil.

5) "Lubricating distillates are classified as follows: Distillate with a viscosity range (Saybolt Universal at 100° F.) between 50 and 100 seconds is reported as non-viscous lubricating distillate. Distillate with viscosity between 100 and 200 seconds is reported as medium lubricating distillate. Distillate with viscosity above 200 seconds is reported as viscous lubricating distillate. The percentages of the lubricating distillates are calculated by plotting the gravities and viscosities of the individual fractions separately against "volume sum percentages" and noting where the 50-second, 100-second, and 200-second points on the viscosity curve intercept the "volume sum percentage" coordinate. The gravities corresponding to these intercepts give the gravity ranges of the distillates."

The above eight determinations constitute the more common tests made on crude oils for general information. In industry much more detailed information is desired and innumerable tests are made, depending on the particular interest and refining process in use by those for whom the tests are made.

Many methods for further interpretation of analytical data have been published of which two in particular have been used in this report. These are the correlation index as developed by Harold M. Smith of the United States Bureau of Mines *(4)*, and the characterization factor as developed by members of the staff of the Universal Oil Products Company *(6, 7, 8)*. Correlation index numbers and characterization factors have been used for further comparisons of the characteristics of crude oils from newer Illinois fields. Due to incomplete analyses available for crude oils from the older Illinois fields it was impossible to obtain their correlation index numbers, but it was possible to estimate their characterization factors for the gasoline and kerosene fractions, which gave a means of further comparison.

CORRELATION INDEX

A description of the correlation index and its use in interpreting crude oil analyses was published first in 1940 by Smith *(4)*. Further use of it was made in a report by Smith *(5)* in interpreting analyses of certain Illinois crude oils. In U. S. Bureau of Mines, R. I. 3532 Mr. Smith explains the correlation index as follows *(4)*:

"The correlation index is a number whose magnitude indicates certain characteristics of a crude-oil distillation fraction. If a fraction were composed exclusively of normal paraffin hydrocarbons, the value of the index number would be zero. If the fraction be from a paraffin-base crude oil of the usual type, its index will not be zero but will be small, while fractions from intermediate and naphthene-base crude oils will have increasingly greater values for the indexes.

"Index numbers, therefore, range from zero for the normal paraffins to approximately 75 for the very naphthenic distillates. The index system, which is based upon the average boiling point and specific gravity of the Hempel fractions, has been so arranged that benzene has an index of 100; and certain crude oils, such as

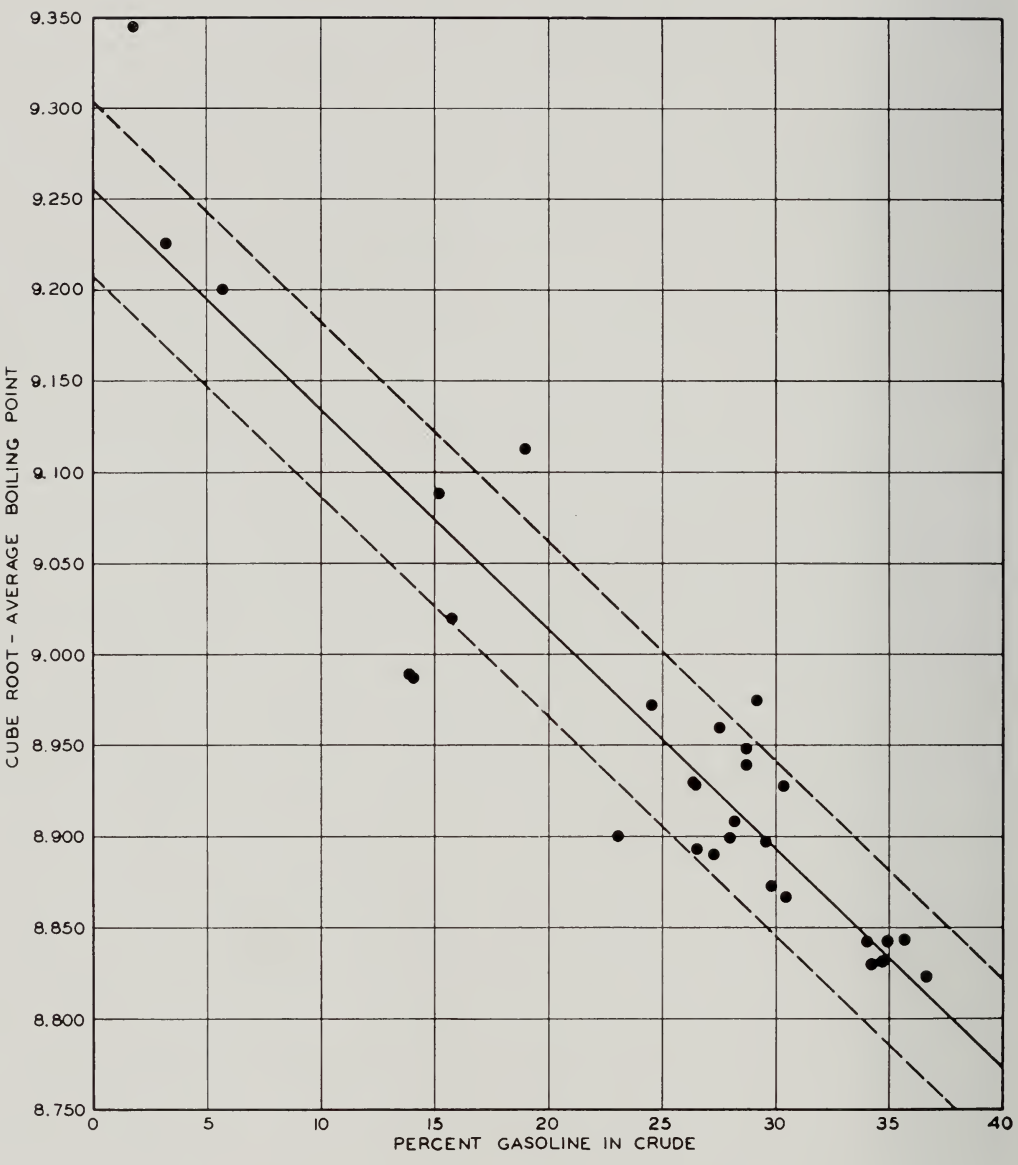

FIG. 1.—Gasoline yields as related to boiling point.

those from Borneo, may have numbers exceeding 100, indicating the probable presence of polycyclic aromatic compounds."

The general equation, according to Smith *(4)*, for calculating the correlation index of a fraction is

$$C.I. = \frac{48640}{K} + 473.7G - 456.8$$

where C.I. is the correlation index, K the average boiling point of the fraction in degrees Kelvin, and G. is the specific gravity of the fraction at 60° F/60° F.

CHARACTERIZATION FACTOR

The characterization factor is mathematically defined as the ratio of the cube root of the average boiling point to the specific gravity at 60°F. or

$$K = \frac{(T_B)^{1/3}}{d}$$

where K = characterization factor
d = specific gravity at 60° F.
T_B = average atmospheric boiling point, ° Rankine.

This factor is not a constant over the entire boiling range of the crude oil, as the fractions vary in their chemical composition. In general, the characterization factor is higher for the lower boiling fractions of a crude oil and decreases for the higher boiling fractions. Numerically, a "characterization factor" value of 12.5-13.0 indicates high paraffinicity whereas values of 10 or below indicate high naphthenicity. Increase in values between 10 and 12 indicates increase in paraffinicity.

The average boiling points for Hempel fractions, as reported by Smith *(4)*, together with specific gravity values determined in this laboratory were used for estimating correlation index numbers and characterization factors. For estimating correlation index numbers for the individual Hempel fractions of crude oils from the newer oil fields, the average boiling points reported by Smith *(4)* were used directly. However, for estimating characterization factors for gasoline and kerosene of crudes from both older and newer fields $(T_B)^{1/3}$ values (cube root of volumetric average boiling point of each fraction making up the gasoline or kerosene) were calculated from determined yields and average fractional boiling points reported by Smith. In determining kerosene yield from the Hempel analysis usually one or two and occasionally three fractions are included. Since the number of fractions making up the kerosene is small, and since the variation in ratios between these fractions is small, $(T_B)^{1/3}$ values for kerosene were estimated directly without plotting calculated data. This was done in the following manner. If the yield of kerosene was zero to 6 per cent, the average boiling point of fraction No. 8 was assumed to be the average boiling point of the kerosene. If the yield was 6 to 11 per cent, the average boiling point was calculated from the average boiling points of fractions Nos. 8 and 9 using average volumes estimated statistically. If the yield was above 11 per cent the average boiling points were calculated from fractions 8, 9, and 10 in the same manner.

In determining gasoline yield from the Hempel analysis seven fractions usually are included. Due to the larger number of fractions and to the variations of the volumetric ratios of these fractions from crude to crude, it is necessary to obtain $(T_B)^{1/3}$ values by plotting individual calculated values for each crude and determining the line of best fit by the method of least squares. This was done and is shown in fig 1. Applying this method to data for newer crude oils it was found that characterization factors for gasolines showed a standard deviation of plus or minus 0.06.

RESULTS

Table 3 presents certain analytical data for crude oils from both older and newer oil fields of Illinois arranged according to geologic age of producing formation. In addition the fields, producing sands, and depths are listed.

Complete analyses for crude oils from newer developments are given in the appendix.

DISCUSSION

General chemical characteristics of Illinois crude oils.—The analytical data in table 3 have not been divided to show those for older and newer fields. Never-

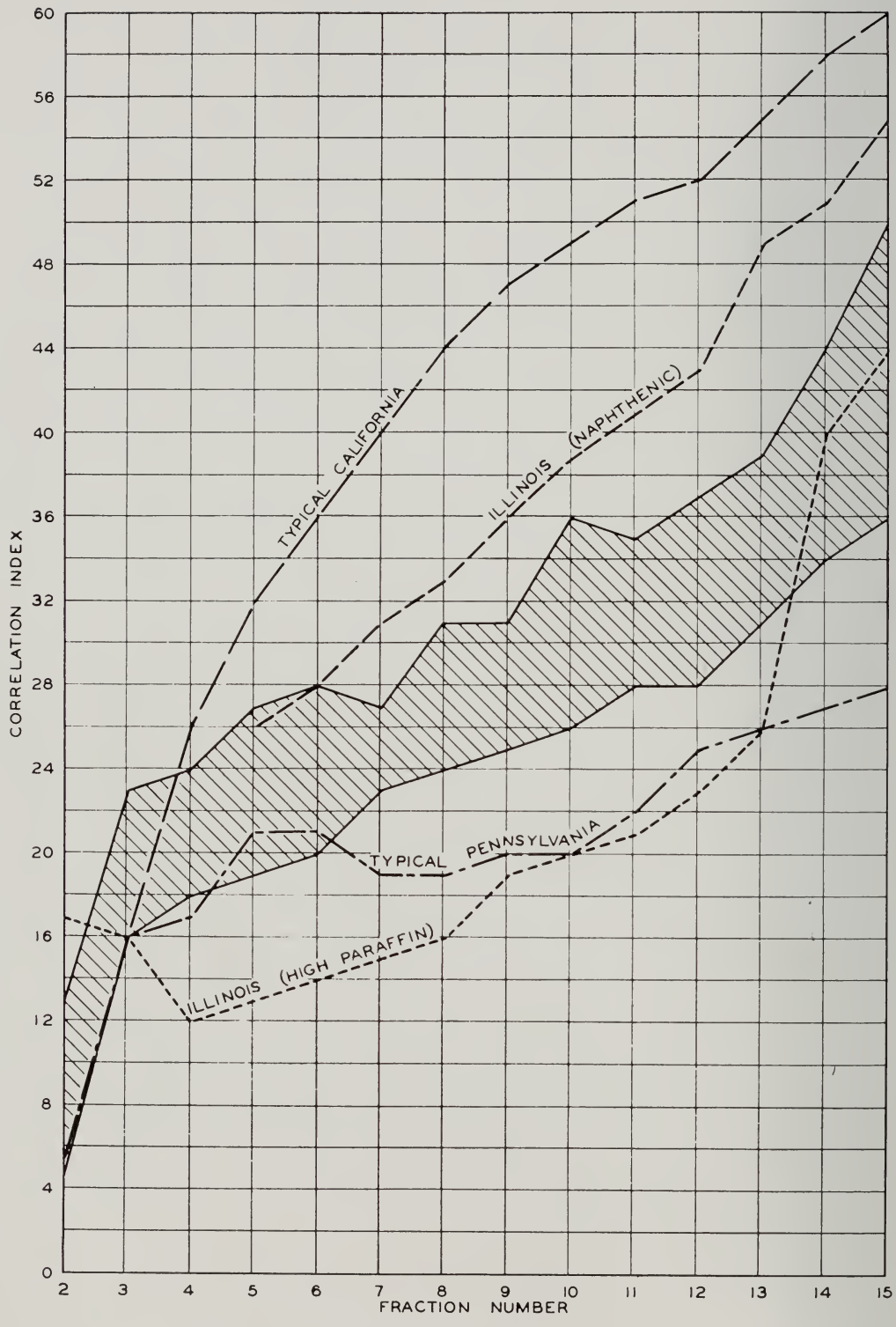

FIG. 2.—Chemical characteristics of Illinois crude oils as shown by correlation index numbers

theless, the crude oils from the older fields, for which data are included in this report, were produced mainly from the Pennsylvanian system but the newer fields have produced very little oil from Pennsylvanian strata. This enables us to compare the chemical characteristics of the crude oils from the older and newer fields.

In general crude oils from newer fields show higher A. P. I. gravities, higher gasoline yields, and lower kerosene yields. The average A. P. I. gravity for crude oils from older fields based on data available is 32.3 as compared to 37.2 for crude oils from the newer fields. The average gasoline yield for the crude oils from old fields is 23.7 per cent as compared to 31.8 per cent for the crude oils from newer fields. The average kerosene yield for the crude oils from old fields is 16.6 per cent as compared to 10.2 per cent for the crude oils from new fields. The average sulfur values for the crude oils from old and new fields are the same being 0.24 per cent for both. The specific gravities and characterization factors for gasoline and kerosene from crude oils from old and new fields are about the same. In general the oils from the newer fields are produced from greater depths than are those from the older fields.

The more complete data available for crude oils from the newer fields permit us to study their chemical characteristics in more detail. For this purpose correlation index numbers and characterization factors have been determined for the individual fractions obtained in the distillation test. These values are recorded in the complete analysis reports presented in the appendix of this report.

In figure 2 correlation index characteristics for these Illinois crude oils are presented graphically. The shaded portion of this figure indicates the range of correlation index numbers for all fractions throughout the entire distillation range that includes about 70 per cent of the crude oils studied. This range indicates crude oils of intermediate base, and we see that the larger majority of our Illinois oils fall in this classification. However certain of the crude oils studied do not fall in this range, as exemplified by curves "Illinois naphthenic" and "Illinois high-paraffin" which are included in figure 2. For comparison, data for a typical California crude oil (which is distinctly naphthenic) and for a typical Pennsylvanian crude oil (which is distinctly paraffinic) have been included in the figure. It will be noted that although the Illinois naphthenic crude oil is distinctly outside the range of correlation index numbers into which the majority of the Illinois crude oils fall, it is not nearly so naphthenic as the typical California crude oil. On the other hand the Illinois high-paraffin crude oil appears to be even more paraffinic than the typical Pennsylvania crude oil in the lower boiling fractions but is less paraffinic or more naphthenic in the higher boiling or lubricating oil fractions.

Although correlation index numbers are not additive on any basis, characterization factors are additive on a weight basis. As this is true it follows that characterization factors may be associated with volumes distilled, in order to present a more quantitative picture of the distribution of characteristics throughout the crude oil. Such a distribution is presented in figure 3. The shaded portion indicates the ranges of characterization factors within which fall approximately 70 per cent of the crude oils studied. Also additional information is presented in this figure on the characterization factor ranges of fractions such as light gasoline, gasoline and naphtha, kerosene, gas oil etc. to be obtained from these crude oils. However it should be stated that the boundaries of these ranges do not represent specific crude oils but rather statistical averages obtained by calculation of all data on the crude oils studied. Furthermore the component volumes are not to be considered cumulative but rather based on statistical averages of all data. An Illinois high-paraffin crude oil and an Illinois naphthenic crude oil are included in figure 3 as representative of those Illinois crude oils which differ from the general average, together with typical California and Pennsylvania crude oils for further comparison.

General characteristics as related to geologic age of the producing strata.— Certain data from the crude-oil analyses are shown in Table 3 in which the arrangement is by geologic age of the producing formation. Averages for each producing formation and each geologic system are included. A. P. I. gravity,

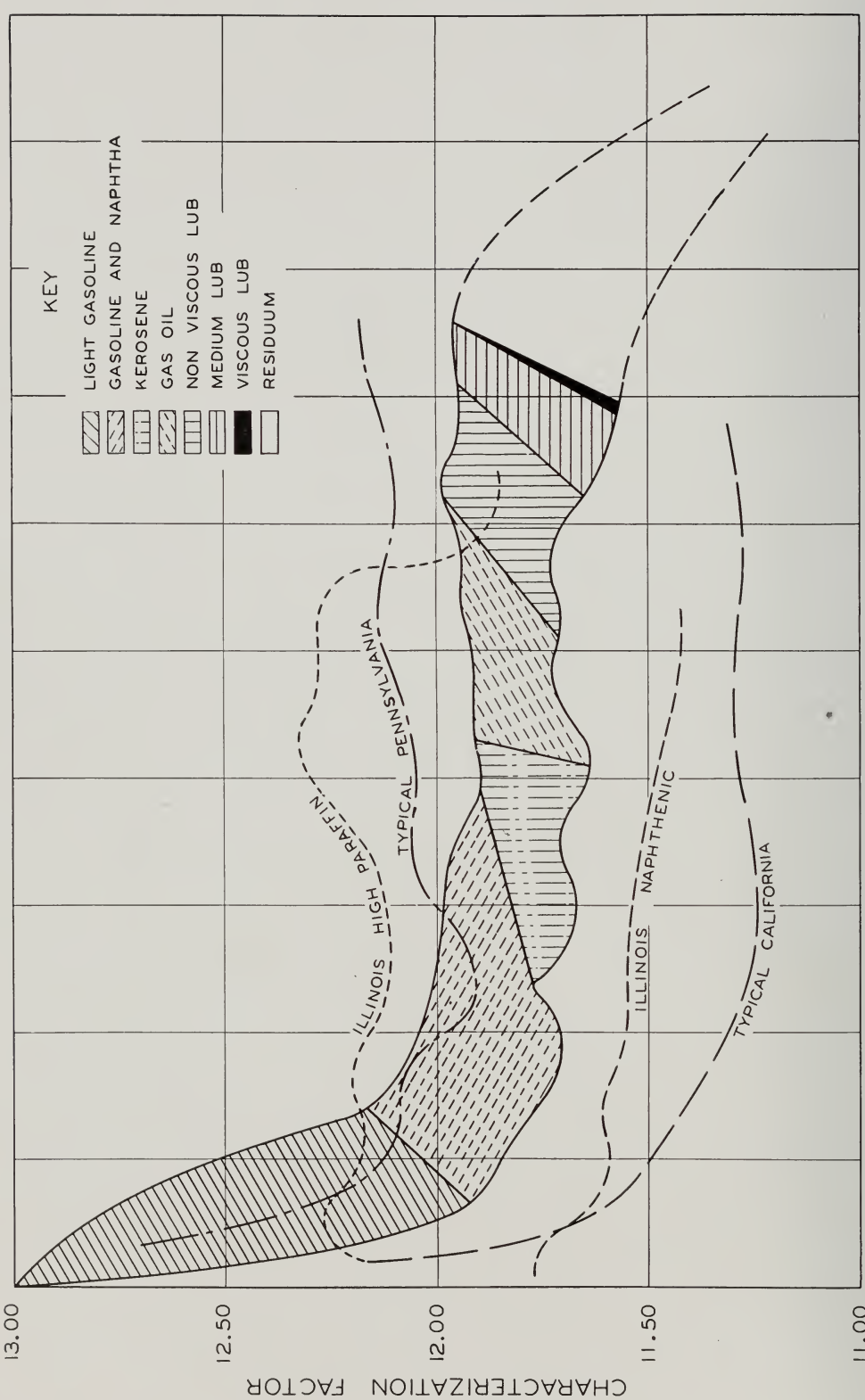

Fig. 3.—Chemical characteristics of Illinois crude oils as shown by characterization factors.

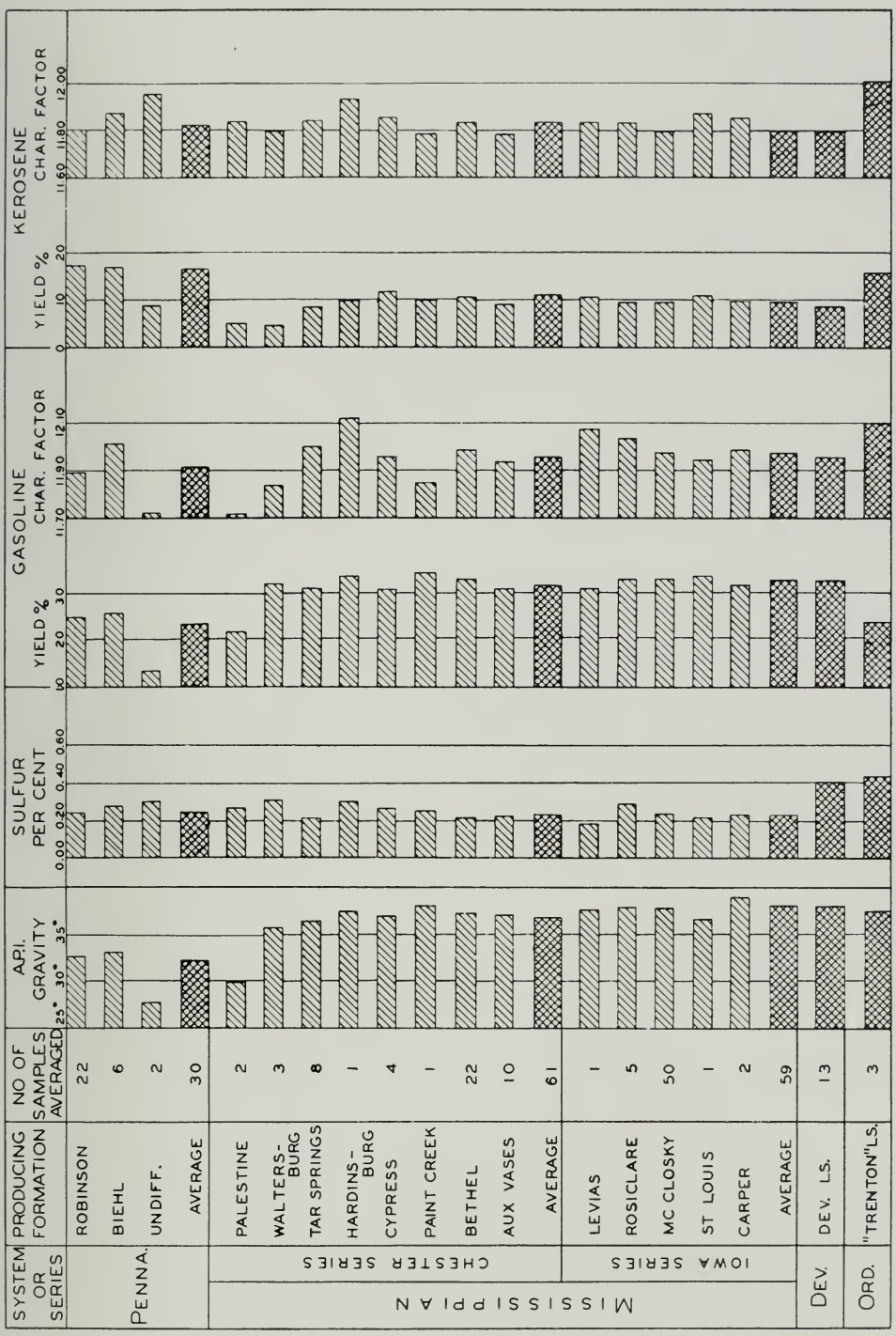

FIG. 4.—Average chemical characteristics of Illinois crude oils from different producing formations.

sulfur content, and gasoline and kerosene yields are shown graphically in figure 4. In general there is a fairly consistent increase in A. P. I. gravity with increase in the geologic age of the producing formation. Gasoline yield shows a tendency to increase and kerosene yield to decrease, with geologic age. Sulfur content does not seem to vary consistently with geologic age. The highest average sulfur content is in oils from the Devonian and Ordovician limestones. The Lower Mississippian oils —mostly from the McClosky oolitic limestone—have an average sulfur content only slightly higher than do the oils from the Chester (Upper Mississippian) sandstones.

Correlation of sulfur content with geographic location.—Figure 5 shows the distribution of higher and lower sulfur crude oils by the counties in which they are produced. For this purpose a dividing value of 0.20 per cent sulfur has been adopted, those sulfur values of 0.20 per cent and above being considered higher and those below 0.20 being considered lower. It appears that higher sulfur crudes are prevalent in the eastern Illinois counties including Crawford, Wabash, White, and Gallatin counties. Immediately west of this zone of higher sulfur crudes we find a predominance of lower sulfur crudes in Richland, Wayne, Hamilton, Franklin, and Washington counties. Continuing east and northeast we find a mixture of higher and lower sulfurs with a decided trend toward a predominance of higher sulfur crude oils. These trends appear to be in general agreement with the trends found by Smith *(5)* in studying certain Illinois crude oils.

Figure 6 presents the producing fields of Illinois located according to counties. By comparing figures 5 and 6, general information may be obtained as to the sulfur characteristics of crude oils produced in various fields. Reference to the complete analyses in the appendix will give more exact information.

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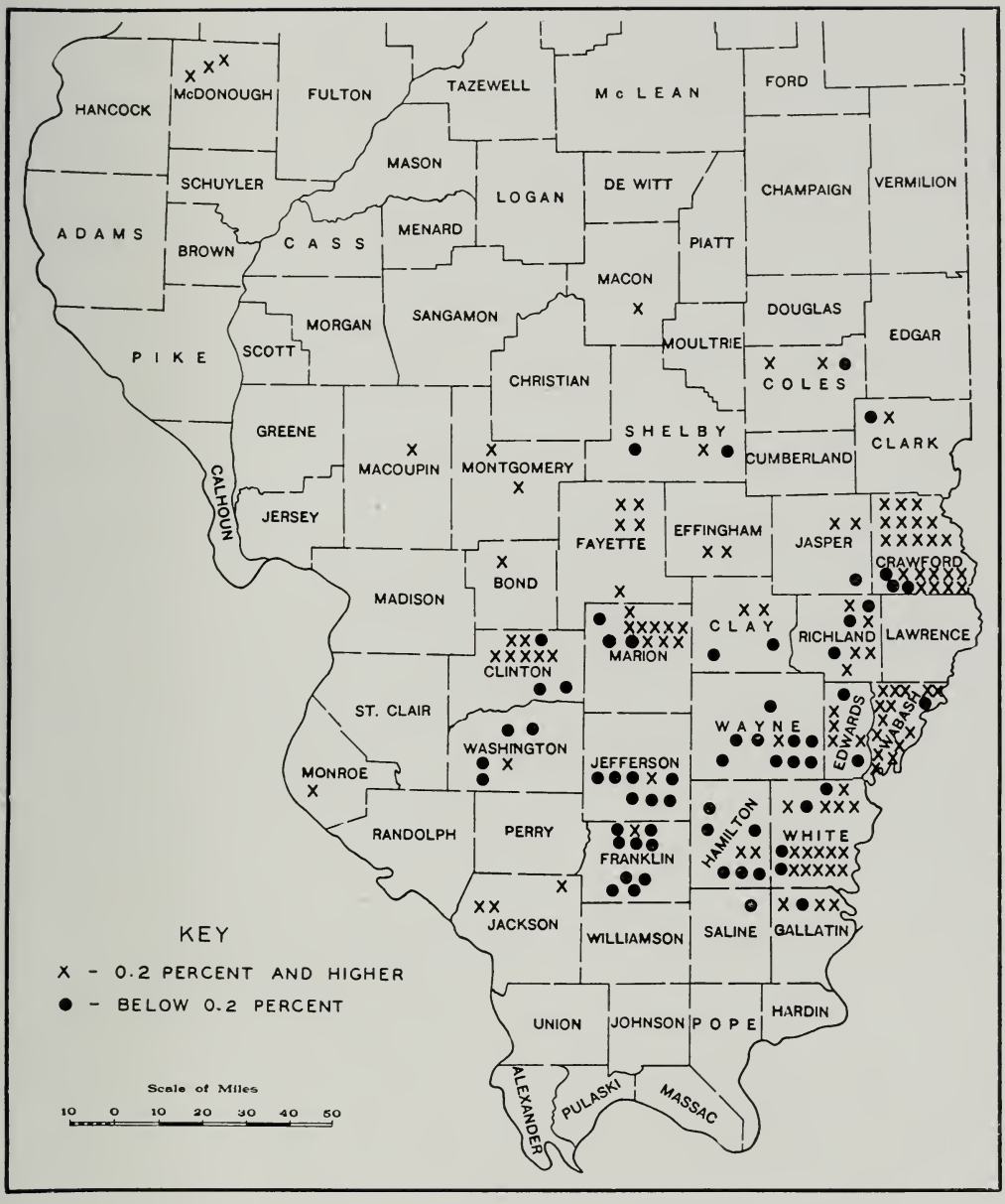


FIG. 5.—Sulfur content of Illinois crude oils, distributed by counties.

INDEX TO POOL NUMBERS

November 1, 1942

Name of Pool—County

1 Colmar–Plymouth—McDonough, Hancock * †
2 Pittsfield (gas, abd. 1930)—Pike *
3 Jacksonville (gas, abd. 1937)—Morgan *
4 Carlinville North—Macoupin
5 Carlinville (abd. 1925)—Macoupin *
6 Spanish Needle Creek (gas, abd. 1934)—Macoupin *
7 Plainview—Macoupin
8 Gillespie–Wyen—Macoupin *
9 Gillespie–Benld (gas, abd. 1935)—Macoupin *
10 Staunton (gas, abd. 1919)—Macoupin *
11 St. Jacob—Madison
12 Collinsville (abd. 1921)—Madison *
13 Dupo—St. Clair *
14 Waterloo—Monroe * †
15 Waggoner—Montgomery
16 Raymond—Montgomery
17 Litchfield (abd. 1904)—Montgomery *
18 Sorento—Bond
19 Ayers (gas)—Bond *
20 Beaver Creek—Bond
21 Woburn—Bond †
22 Greenville (gas, abd. 1923)—Bond *
23 Boulder—Clinton
24 Frogtown (abd. 1933)—Clinton *
25 Carlyle—Clinton * †
26 Bartelso—Clinton * †
27 Posey—Clinton
28 Hoffman—Clinton †
29 Centralia—Clinton, Marion †
30 Centralia West—Clinton
31 Irvington—Washington †
32 McKinley—Washington
33 Cordes—Washington †
34 Dubois—Washington †
35 Dubois West—Washington
36 Sparta (gas, abd. 1900)—Randolph *
37 Tamaroa—Perry
38 Ava–Campbell Hill (gas, abd. 1934)—Jackson * †
39 Elkville—Jackson
40 Lakewood—Shelby
41 Stewardson—Shelby †
42 Louden—Fayette, Effingham †
43 St. James—Fayette †
44 St. Paul—Fayette
45 Patoka—Marion †
46 Patoka East—Marion
47 Alma—Marion
48 Fairman—Marion, Clinton †
49 Sandoval—Marion * †
50 Tonti—Marion †
51 Junction City—Marion *
52 Salem—Marion †
53 Langewisch–Kuester—Marion *
54 Brown—Marion *
55 Wamac—Marion, Clinton, Washington *
56 Cravat—Jefferson †
57 Dix—Jefferson, Marion †
58 Kell—Jefferson, Marion
59 Roaches—Jefferson †
60 Woodlawn—Jefferson
61 Marcoe (abd. 1941)—Jefferson †
62 King—Jefferson
63 Markham City—Jefferson
64 Elk Prairie (abd. 1940)—Jefferson

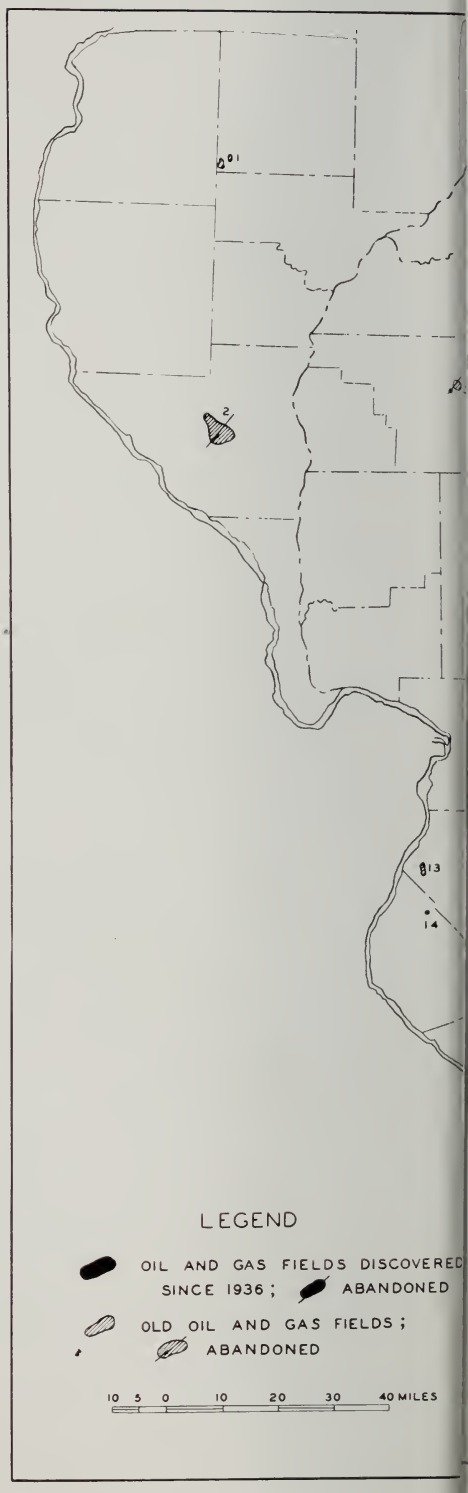
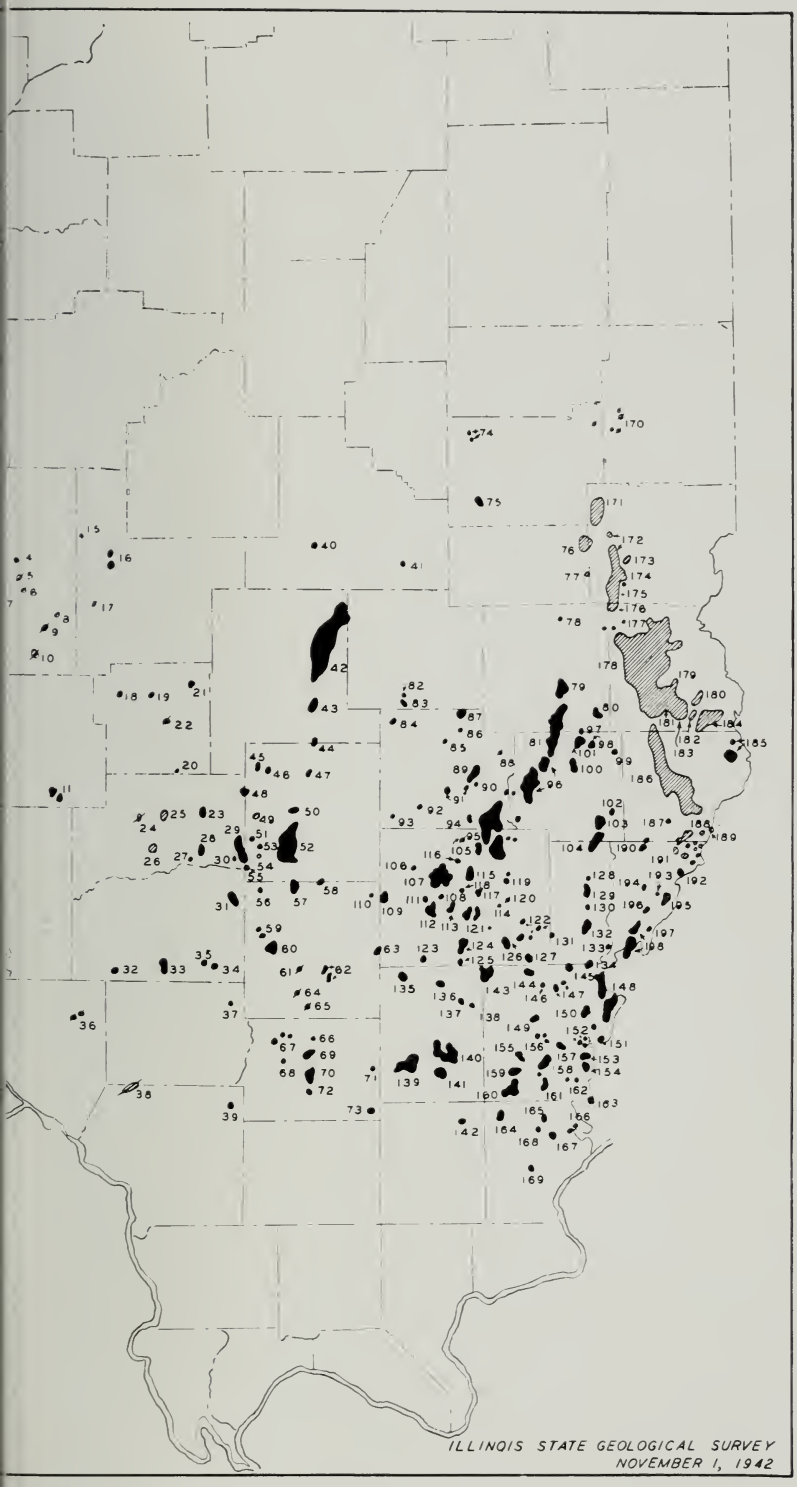


FIG. 6.—Oil an



s fields of Illinois, as of November, 1942.

INDEX TO POOL NUMBERS (Continued)

Name of Pool—County

65 Ina (abd. 1941)—Jefferson †
66 Whittington—Franklin †
67 Sesser—Franklin
68 Valier—Franklin
69 Benton North—Franklin
70 Benton—Franklin
71 Akin—Franklin
72 West Frankford—Franklin
73 Thompsonville—Franklin †
74 Cooks Mills—Coles
75 Mattoon—Coles †
76 Siggins—Cumberland, Clark *
77 York—Cumberland *
78 Hidalgo—Jasper
79 Boos North—Jasper †
80 Ste. Marie—Jasper
81 Dundas Consol.—Jasper, Richard †
82 Mason—Effingham
83 Mason South—Effingham
84 Iola—Clay †
85 Toliver—Clay
86 Bible Grove South—Clay
87 Bible Grove—Clay
88 Ingraham (abd. 1942)—Clay
89 Sailor Springs—Clay
90 Sailor Springs South—Clay
91 Flora—Clay †
92 Kenner—Clay
93 Xenia—Clay
94 Clay City West—Clay
95 Clay City Consol.—Clay, Wayne †
96 Noble—Richland †
97 Dundas East—Richland, Jasper
98 Stringtown—Richland
99 Amity—Richland
100 Olney—Richland †
101 Schnell—Richland †
102 Bonpas—Richland
103 Bonpas West—Richland
104 Parkersburg—Richland, Edwards
105 Rinard (abd. 1942)—Wayne
106 Johnsonville West—Wayne
107 Johnsonville—Wayne
108 Johnsonville South—Wayne
109 Coil—Wayne
110 Coil West—Jefferson
111 Sims North—Wayne
112 Sims—Wayne
113 Covington—Wayne
114 Fairfield—Wayne
115 Cisne—Wayne †
116 Cisne North—Wayne
117 Geff—Wayne
118 Geff West—Wayne
119 Mt. Erie—Wayne †
120 Mt. Erie South (abd. 1941)—Wayne
121 Boyleston—Wayne †
122 Goldengate—Wayne †
123 Mayberry—Wayne
124 Aden North—Wayne †
125 Aden—Wayne, Hamilton
126 Barnhill—Wayne †
127 Leech Twp.—Wayne †
128 Samsville—Edwards
129 Bone Gap—Edwards
130 Albion North—Edwards
131 Ellery—Edwards, Wayne
132 Albion—Edwards †
133 Cowling—Edwards †

Name of Pool—County

134 Grayville—Edwards, White †
135 Dahlgren—Hamilton
136 Belle Prairie—Hamilton †
137 Blairsville—Hamilton
138 Bungay—Hamilton †
139 Rural Hill—Hamilton
140 Dale-Hoodville Consol.—Hamilton †
141 Walpole—Hamilton
142 Eldorado—Saline
143 Mill Shoals—White, Hamilton †
144 Burnt Prairie—White †
145 Grayville West—White
146 Centerville—White
147 Centerville East—White
148 New Harmony Consol.—White †
149 Carmi North—White
150 Phillipstown—White †
151 New Harmony South—White
152 Maunie North—White
153 Maunie—White
154 Maunie South—White
155 Stokes—White †
156 Carmi—White
157 Epworth—White
158 Storms—White †
159 Iron—White †
160 Roland—White, Gallatin
161 Herald—White
162 Concord—White
163 New Haven—White
164 Omaha—Gallatin †
165 Inman North—Gallatin
166 Inman East—Gallatin
167 Inman—Gallatin †
168 Inman West—Gallatin
169 Junction—Gallatin †
170 Warrentown-Borton—Egar *
171 Westfield—Clark, Coles * †
172 Casey—Clark *
173 Martinsville—Clark * †
174 North Johnson—Clark *
175 South Johnson—Clark *
176 Bellair—Crawford, Jasper *
177 New Bellair—Crawford
178 Main—Crawford * †
179 New Hebron—Crawford *
180 Flat Rock—Crawford *
181 Chapman—Crawford *
182 Allison-Weger—Crawford *
183 Parker—Crawford *
184 Birds—Crawford, Lawrence *
185 Russellville (gas)—Lawrence
186 Lawrence—Lawrence, Crawford * †
187 Ruark—Lawrence
188 St. Francisville—Lawrence *
189 St. Francisville East—Lawrence
190 Lancaster—Wabash, Lawrence †
191 Allendale—Wabash * †
192 Patton—Wabash
193 Mt. Carmel West—Wabash
194 Friendsville—Wabash
195 Mt. Carmel—Wabash †
196 Maud—Wabash †
197 Keensburg East—Wabash †
198 Keensburg Consol.—Wabash †

* Pools discovered prior to January 1, 1937.
† Pools, samples from which are represented by analyses in this report.

TABLE 3—ANALYTICAL DATA FOR CRUDE OILS ARRANGED ACCORDING TO GEOLOGIC AGE OF PRODUCING STRATA

Oil-producing Strata	Pool or Field	County	Map Index Number (fig. 6)	Average Depth in feet	Lab. No.	Depth feet	A. P. I. Gravity	Sulfur per cent	GASOLINE			KEROSENE		
									Yield	Sp. G.	Characterization Factor	Yield	Sp. G.	Characterization Factor
Pennsylvanian system														
Robinson sd.....	Main	Crawford	159	900–1000	15034	925	32.2	0.26	20.4	0.751	11.98	17.9	0.815	11.90
	Main	Crawford	159	.....	15035	1000	33.7	0.23	28.2	0.751	11.87	18.5	0.820	11.83
	Main	Crawford	159	.....	15036	887	30.0	0.28	17.2	0.770	11.74	19.3	0.825	11.75
	Main	Crawford	159	.....	15037	.....	32.6	0.26	24.5	0.754	11.88	16.9	0.823	11.78
	Main	Crawford	159	.....	15038	1000	28.7	0.25	15.5	0.766	11.83	16.3	0.831	11.67
	Main	Crawford	159	.....	15039	1000	32.6	0.22	25.2	0.754	11.86	16.8	0.824	11.77
	Main	Crawford	159	.....	15040	1025	34.7	0.21	28.8	0.740	12.04	15.7	0.821	11.81
	Main	Crawford	159	.....	15041	973	32.2	0.23	21.5	0.755	11.90	17.2	0.816	11.88
	Main	Crawford	159	.....	15042	900	34.3	0.19	26.6	0.736	12.13	16.0	0.813	11.88
	Main	Crawford	159	.....	15043	1000	32.6	0.22	23.8	0.753	11.90	17.4	0.820	11.83
	Main	Crawford	159	.....	15044	1000	32.6	0.21	25.1	0.757	11.82	16.7	0.825	11.75
	Main	Crawford	159	.....	15079	.....	30.0	0.27	20.3	0.761	11.83	16.3	0.830	11.68
	Main	Crawford	159	.....	15080	1000	33.2	0.23	23.9	0.752	11.91	17.4	0.820	11.83
	Main	Crawford	159	.....	15081	1020	33.5	0.23	27.8	0.752	11.86	16.2	0.823	11.78
	Main	Crawford	159	.....	15083	920	33.5	0.19	27.5	0.750	11.89	21.6	0.819	11.84
	Main	Crawford	159	.....	15084	1006	34.7	0.19	28.8	0.745	11.96	17.8	0.818	11.85
	Main	Crawford	159	.....	15085	1000	34.7	0.21	30.1	0.745	11.94	16.3	0.820	11.83
	Main	Crawford	159	.....	15086	900	30.4	0.23	18.6	0.760	11.87	17.1	0.820	11.83
	Main	Crawford	159	.....	15087	925	32.4	0.22	23.8	0.754	11.90	18.3	0.819	11.84
	Main	Crawford	159	.....	15090	1000	33.6	0.23	26.3	0.752	11.82	16.2	0.824	11.77
	Main	Crawford	159	.....	15091	1000	30.7	0.21	21.3	0.761	11.81	16.7	0.831	11.67
	Main	Crawford	159	.....	15092	1000	33.6	0.23	27.7	0.744	11.99	16.7	0.821	11.81
Robinson Av.).....	.....	.....	.....	.....	.....	.....	32.5	0.23	24.4	0.753	11.89	17.2	0.824	11.80
Biehl sd.....	Allendale	Wabash	173	1450	14663	1510	34.7	0.30	29.0	0.738	12.07	16.3	0.818	11.85
	Allendale	Wabash	173	.....	14664	1526	30.4	0.28	19.0	0.758	11.89	19.7	0.816	11.88
	Allendale	Wabash	173	.....	14665	1586	28.7	0.26	17.5	0.755	11.96	19.0	0.819	11.84
	Allendale	Wabash	173	.....	14666	1580	34.7	0.21	29.4	0.738	12.06	16.0	0.816	11.88

TABLE 3—ANALYTICAL DATA FOR CRUDE OILS ARRANGED ACCORDING TO GEOLOGIC AGE OF PRODUCING STRATA—Continued

Oil-producing Strata	Pool or Field	County	Map Index Number (fig. 6)	Average Depth in feet	Lab. No.	Depth feet	A. P. I. Gravity	Sulfur per cent	GASOLINE			KEROSENE		
									Yield	Sp. G.	Characterization Factor	Yield	Sp. G.	Characterization factor
	Allendale	Wabash	173	.....	14667	1366	34.9	0.25	29.0	0.733	12.15	15.6	0.817	11.87
Biehl sd.	Allendale	Wabash	173	.....	14668	1513	34.5	0.32	28.7	0.736	12.10	15.6	0.815	11.90
(Biehl Av.)							32.9	0.27	25.4	0.743	12.04	17.0	0.817	11.87
Penn. sd.	Raymond	Montgomery	16	600	0–260	598	34.8	0.22	24.6	0.738	12.14	17.7	0.811	11.96
	Carlinville North	Macoupin	4	435	0–293	474	20.3	0.35	1.9	0.817	11.30	0.0	.....	.....
(Penn. sd. Av.)							27.6	0.29	13.3	0.778	11.72			
(Pennsylvanian Av.)							32.3	0.24	23.7	0.753	11.91	16.6	0.820	11.82
Mississippian system Chester(Upper Miss.) series Palestine fm.	Omaha	Gallatin	146	1670	0–257	2136	25.9	0.23	14.1	0.789	11.50	0.0	.....	.....
	Maunie	White	153	2010	0–274	2018	33.8	0.28	29.4	0.747	11.92	10.1	0.811	11.84
(Palestine Av.)							29.9	0.26	21.8	0.768	11.71		.....	.....
Waltersburg fm.	Junction	Gallatin	150	1794	0–181	1794	37.2	0.22	33.0	0.753	11.77	4.8	0.811	11.73
	Storms	White	140	2230	0–204	2270	32.1	0.28	28.1	0.763	11.68	0.0	.....	.....
	New Harmony Cons.	White	129	2150	0–224	2209	37.6	0.40	34.2	0.730	12.13	9.9	0.809	11.87
(Waltersburg Av.)							35.6	0.30	31.7	0.748	11.86	3.7	0.810	11.80
Tar Springs fm.	New Harmony Cons.	White	129	2090	0–248	2205	36.0	0.19	32.2	0.741	11.97	10.2	0.807	11.90
	Benton	Franklin	70	2110	0–263	2148	41.7	0.12	34.0	0.733	12.07	10.0	0.807	11.90
	Herald	White	161	2260	0–265	2266	37.2	0.24	31.9	0.735	12.07	9.6	0.814	11.80
	W. Frankfort	Franklin	72	2040	0–267	2080	38.4	0.13	32.9	0.731	12.12	10.1	0.810	11.85

TABLE 3—ANALYTICAL DATA FOR CRUDE OILS ARRANGED ACCORDING TO GEOLOGIC AGE OF PRODUCING STRATA—Continued

Oil-producing Strata	Pool or Field	County	Map Index Number (fig. 6)	Average Depth in feet	Lab. No.	Depth feet	A. P. I. Gravity	Sulfur per cent	GASOLINE			KEROSENE		
									Yield	Sp. G.	Character-ization Factor	Yield	Sp. G.	Character-ization Factor
Tar Springs fm., Cont.	New Haven	White	163	2110	0–269	2129	36.4	0.27	34.8	0.735	12.01	4.5	0.815	11.67
	Sailor Springs	Clay	89	2330	0–297	2326	37.0	0.17	31.3	0.736	12.06	9.4	0.807	11.90
	Inman East	Gallatin	166	2080	0–298	2081	34.6	0.24	32.0	0.737	12.04	10.6	0.812	11.83
	Centerville East	White	147	2475	0–302	2551	37.2	0.20	33.4	0.733	12.08	9.3	0.811	11.85
	Omaha	Gallatin	164	1880	0–319	1932	27.0	0.24	13.9	0.788	11.53	0.0	.....	.....
(Tar Springs Av.)	.....	.....	.....	.....	.....	.....	36.2	0.20	30.7	0.741	11.99	8.2	0.810	11.84
Hardinsburg fm.	Iron	White	141	2710	0–215	2528	37.2	0.29	33.1	0.732	12.11	9.6	0.805	11.93
Cypress fm.	Mattoon	Coles	68	1830	0–162	1877	44.1	0.16	32.0	0.751	11.65	10.5	0.817	11.75
Cypress fm.	Keensburg Cons.	Wabash	179	2430	0–169	2424	38.6	0.29	33.7	0.753	11.76	4.9	0.810	11.75
Cypress fm.	Bartelso	Clinton	24	980	0–175	1017	36.2	0.20	32.7	0.754	11.76	11.1	0.815	11.78
Weiler sd.	Louden	Fayette	39	1470	0–184	1540	36.6	0.25	29.8	0.737	12.07	9.8	0.811	11.84
Weiler sd.	St. James	Fayette	40	1600	0–192	1631	34.4	0.31	26.6	0.747	11.95	9.4	0.815	11.78
Carlyle sd.	Carlyle	Clinton	23	1030	0–199	1060	35.2	0.26	30.9	0.751	11.83	4.9	0.814	11.69
Weiler sd.	Noble	Richland	84	2550	0–213	2592	34.6	0.27	28.7	0.743	11.99	11.0	0.804	11.94
Cypress fm.	Dale	Hamilton	121	2680	0–220	2700	37.6	0.25	32.9	0.730	12.14	15.4	0.815	11.90
Cypress fm.	Cowling	Edwards	114	2620	0–246	2640	36.6	0.23	31.3	0.732	12.13	10.5	0.806	11.91
Weiler sd.	Patoka E.	Marion	46	1350	0–270	1370	36.0	0.18	31.3	0.733	12.11	10.2	0.812	11.83
Weiler sd.	Posey	Clinton	27	1100	0–273	1108	35.8	0.17	30.0	0.738	12.05	10.3	0.807	11.90
Cypress fm.	Inman E.	Gallatin	166	2430	0–299	2447	35.2	0.23	30.8	0.747	11.89	10.3	0.813	11.81
Cypress fm.	Ava-C. H.	Jackson	35	780	15088	950	35.3	0.33	28.2	0.740	12.04	19.6	0.810	11.97
Cypress fm.	Ava-C. H.	Jackson	35	780	15089	950	36.9	0.35	28.4	0.743	11.99	21.0	0.804	12.06
(Cypress Av.)	.....	.....	.....	.....	.....	.....	36.7	0.25	30.5	0.743	11.95	11.4	0.811	11.85
Paint Creek fm.	Louden	Fayette	39	1530	0–209	1579	37.8	0.24	33.7	0.748	11.84	9.7	0.815	11.78
Bethel fm.	Patoka	Marion	42	1420	0–142	1418	37.0	.....	33.0	0.734	12.08	13.0	0.813	11.93
	Centralia	Clinton												
		Marion	27	1350	0–147	1361	37.7	.....	35.0	0.736	12.02	14.0	0.816	11.88

TABLE 3—ANALYTICAL DATA FOR CRUDE OILS ARRANGED ACCORDING TO GEOLOGIC AGE OF PRODUCING STRATA—Continued

Oil-producing Strata	Pool or Field	County	Map Index Number (fig. 6)	Average Depth in feet	Lab. No.	Depth feet	A. P. I. Gravity	Sulfur per cent	GASOLINE			KEROSENE		
									Yield	Sp. G.	Characterization Factor	Yield	Sp. G.	Characterization Factor
Bethel fm.—Cont.	Salem	Marion	49	1770	0–157	1702	39.4	0.18	34.4	0.734	12.06	13.5	0.813	11.93
	Cordes	Washington	31	1260	0–173	1281	37.4	0.19	32.5	0.754	11.76	10.0	0.817	11.75
	Salem	Marion	49	1770	0–174	1871	38.2	0.19	33.6	0.742	11.94	9.5	0.820	11.71
	Salem	Marion	49	1770	0–177	1793	38.8	0.22	34.9	0.758	11.67	4.9	0.810	11.75
	Fairman	Marion–Clinton	45	1430	0–211	1439	35.2	0.27	32.8	0.741	11.96	10.0	0.817	11.75
	DuBois	Washington	32	1360	0–230	1370	31.0	0.26	27.5	0.765	11.65	4.6	0.823	11.57
	Hoffman	Clinton	26	1320	0–233	1329	33.2	0.21	27.6	0.748	11.93	11.7	0.805	11.93
	Cravat	Jefferson	53	2070	0–238	2079	35.4	0.23	31.7	0.741	11.98	10.4	0.813	11.81
	Dix	Jefferson	54	1950	0–240	1964	38.0	0.18	34.0	0.742	11.93	4.6	0.813	11.70
	New Harmony Cons.	White	129	2570	0–247	2719	36.0	0.24	33.6	0.738	12.00	10.5	0.810	11.85
	Irvington	Washington	29	1540	0–256	1534	37.6	0.16	34.3	0.733	12.08	10.1	0.809	11.87
	Woburn	Bond	19	1010	0.259	1020	36.4	0.20	29.4	0.739	12.04	9.8	0.809	11.87
	McKinley	Washington	32	980	0–261	1034	44.1	0.18	42.0	0.725	12.07	10.1	0.814	11.80
	Dale-Hoodville Consol.	Hamilton	140	2950	0–268	2959	38.2	0.14	31.8	0.736	12.05	9.9	0.814	11.80
	Woodlawn	Jefferson	60	1910	0–280	2017	37.8	0.16	35.0	0.750	11.78	9.4	0.813	11.81
	Elkville	Jackson	39	2200	0–285	2028	35.8	0.22	28.0	0.729	12.23	16.0	0.812	11.94
	Woodlawn	Jefferson	60	1910	0–287	1991	38.2	0.16	33.8	0.733	12.07	9.8	0.805	11.93
	Benton N.	Franklin	69	2610	0–307	2623	38.4	0.15	34.6	0.732	12.07	10.5	0.811	11.84
	St. Paul	Fayette	44	1880	0–308	1909	33.2	0.21	26.5	0.743	12.03	10.3	0.808	11.88
	Centralia West	Clinton	30	1410	0–310	1441	37.8	0.17	35.0	0.729	12.12	10.1	0.809	11.87
(Bethel Av.)							37.0	0.20	32.8	0.740	11.98	10.1	0.812	11.83
Aux Vases fm.	Mill Shoals	White–Hamilton	124	3220	0–170	3258	39.8	0.14	33.8	0.756	11.71	5.3	0.823	11.56
	Salem	Marion	49	1840	0–176	1838	38.6	0.21	33.7	0.759	11.66	4.8	0.813	11.70
	Stewardson	Shelby	38	1940	0–178	1969	37.8	0.18	33.5	0.750	11.81	4.6	0.812	11.72

TABLE 3—ANALYTICAL DATA FOR CRUDE OILS ARRANGED ACCORDING TO GEOLOGIC AGE OF PRODUCING STRATA—Continued

Oil-producing Strata	Pool or Field	County	Map Index Number (fig. 6)	Average Depth in feet	Lab. No.	Depth feet	A. P. I. Gravity	Sulfur per cent	GASOLINE			KEROSENE		
									Yield	Sp. G.	Characterization Factor	Yield	Sp. G.	Characterization factor
Aux Vases fm.—Cont.	Iola	Clay	77	2360	0-190	2356	35.4	0.25	31.4	0.738	12.03	9.4	0.815	11.78
	Dale-Hoodville Consol.	Hamilton	140	2970	0-272	3081	39.4	0.17	33.0	0.732	12.10	9.3	0.812	11.83
	Lakewood	Shelby	40	1720	0-282	1735	31.7	0.23	19.0	0.764	11.81	10.8	0.810	11.85
	Xenia	Clay	93	2790	0-292	2790	35.2	0.19	31.0	0.732	12.13	9.3	0.809	11.87
	Cooks Mills	Coles	74	1830	0-295	1842	36.4	0.40	30.0	0.740	12.02	9.5	0.809	11.87
	Eldorado	Saline	142	2865	0-300	2920	34.2	0.14	23.1	0.751	11.95	9.9	0.815	11.78
	Benton N.	Franklin	69	2690	0-304	2726	39.0	0.15	34.3	0.732	12.08	16.0	0.813	11.81
(Aux Vases Av.)							36.8	0.21	30.3	0.745	11.93	8.9	0.813	11.78
(Chester Av.)							36.5	0.22	31.2	0.743	11.95	10.9	0.812	11.83
Iowa (Lower Miss.) series Ste. Genevieve fm. (Levias)														
Rosiclare member	Patoka	Marion	42	1550	0-158	1612	40.9	0.31	34.6	0.735	11.97	9.9	0.807	11.90
	Burnt Prairie	White	125	3260	0-223	3505	37.0	0.28	34.7	0.737	12.00	10.5	0.809	11.87
	Mt. Carmel	Wabash	176	2370	0-226	2408	36.6	0.36	31.5	0.747	11.89	4.9	0.820	11.60
	Benton N.	Franklin	69	2800	0-305	2794	38.4	0.15	33.9	0.732	12.09	9.5	0.813	11.81
	Benton N.	Franklin	69	2710	0-306	2772	37.4	0.17	30.7	0.736	12.07	10.5	0.812	11.83
	Alma	Marion	47	2070	0-311	2101	36.2	0.26	31.0	0.729	12.18	9.9	0.804	11.94
(Rosiclare Av.)							37.8	0.26	32.7	0.736	12.03	9.2	0.811	11.83
McClosky "lime"	Clay City Cons.	Clay / Wayne	83	2980	0-143	3002	39.0	.....	34.5	0.739	11.97	10.5	0.816	11.77
	Noble	Richland	84	2960	0-144	2985	39.0	.....	33.0	0.740	11.98	12.1	0.814	11.80
	Lawrence	Lawrence	167	1700	0-148	1755	41.3	.....	35.2	0.752	11.76	12.3	0.819	11.72
	Mill Shoals	White / Hamilton	124	3350	0-166	3380	38.0	0.16	33.7	0.766	11.57	4.7	0.819	11.62

TABLE 3—ANALYTICAL DATA FOR CRUDE OILS ARRANGED ACCORDING TO GEOLOGIC AGE OF PRODUCING STRATA—Continued

Oil-producing Strata	Pool or Field	County	Map Index Number (fig. 6)	Average Depth in feet	Lab. No.	Depth feet	A. P. I. Gravity	Sulfur per cent	GASOLINE			KEROSENE		
									Yield	Sp. G.	Characterization Factor	Yield	Sp. G.	Characterization factor
McClosky "lime"—Cont.	Goldengate	Wayne	103	3370	0–168	3381	34.4	0.18	24.6	0.748	11.64	4.4	0.817	11.65
	Tonti	Marion	47	2130	0–172	2212	39.4	0.21	34.0	0.748	11.84	4.8	0.817	11.65
	Keensburg Cons.	Wabash	179	2710	0–180	2881	37.0	0.38	33.5	0.744	11.86	4.3	0.821	11.59
	Boyleston	Wayne	102	3250	0–185	3253	40.2	0.14	35.8	0.740	11.95	5.1	0.813	11.70
	Grayville	Edwards / White	115	3130	0–186	3155	35.8	0.31	30.6	0.747	11.90	4.5	0.815	11.67
	Mt. Erie	Wayne	100	3080	0–191	3135	39.8	0.18	33.7	0.741	11.95	4.6	0.813	11.70
	Cisne	Wayne	98	3120	0–193	3141	35.8	0.24	30.5	0.753	11.79	10.4	0.817	11.75
	North Aden	Wayne	105	3310	0–203	3408	39.0	0.17	33.2	0.742	11.94	9.5	0.818	11.74
	Phillipstown	White	132	2960	0–205	2962	38.2	0.21	34.2	0.739	11.98	9.8	0.817	11.75
	Grayville	Edwards / White	115	3130	0–207	3032	31.9	0.33	30.4	0.764	11.64	5.6	0.818	11.63
	Tonti	Marion	47	2130	0–208	2149	38.4	0.25	33.3	0.738	12.00	9.7	0.816	11.77
	Flora	Clay	80	2970	0–210	2983	37.2	0.24	32.6	0.748	11.86	10.1	0.817	11.75
	Whittington*	Franklin	61	2870	0–212	3068	37.6	0.24	34.1	0.745	11.99	10.3	0.809	11.87
	Lancaster	Wabash	172	2670	0–214	2741	39.8	0.28	36.0	0.727	12.11	9.6	0.809	11.87
	E. Keensburg	Wabash	178	2710	0–216	2714	37.6	0.26	32.3	0.732	12.12	9.4	0.810	11.85
	Inman	Gallatin	149	.....	0–217	3007	38.0	0.20	31.9	0.736	12.06	9.8	0.811	11.84
	Albion	Edwards	113	3110	0–218	3175	40.0	0.18	35.9	0.731	12.07	9.6	0.812	11.83
	Dundas Cons.	Jasper / Richland	74	2840	0–221	2847	39.6	0.26	35.8	0.727	12.14	15.3	0.813	11.93
	Schnell	Richland	88	3010	0–225	3036	37.0	0.19	31.0	0.749	11.86	10.4	0.818	11.74
	Olney	Richland	86	3050	0–227	3090	37.2	0.19	32.5	0.748	11.86	10.6	0.815	11.78
	Dundas Cons.	Jasper / Richland	74	2840	0–232	2915	38.4	0.17	35.0	0.737	12.00	10.1	0.812	11.83
	Mattoon	Coles	68	2000	0–234	2026	36.6	0.29	32.6	0.738	12.02	10.6	0.811	11.84
	Leech Twp.	Wayne	108	3410	0–235	3485	39.0	0.19	32.0	0.736	12.06	10.1	0.814	11.80
	Barnhill	Wayne	107	3390	0–236	3411	37.6	0.17	30.9	0.748	11.88	10.3	0.819	11.72
	Stokes	White	137	3080	0–237	3149	35.8	0.26	31.4	0.741	11.98	10.1	0.814	11.80

* Production from both McClosky and St. Louis limestones.

TABLE 3—ANALYTICAL DATA FOR CRUDE OILS ARRANGED ACCORDING TO GEOLOGIC AGE OF PRODUCING STRATA—Continued

Oil-producing Strata	Pool or Field	County	Map Index Number (fig. 6)	Average Depth in feet	Lab. No.	Depth feet	A. P. I. Gravity	Sulfur per cent	GASOLINE			KEROSENE		
									Yield	Sp. G.	Characterization Factor	Yield	Sp. G.	Characterization factor
McClosky "lime"—Cont.	Roaches	Jefferson	56	2200	0–242	2258	37.0	0.22	32.5	0.736	12.05	9.7	0.811	11.84
	N. Boos	Jasper	72	2840	0–245	2882	38.6	0.20	34.9	0.734	12.05	10.5	0.811	11.84
	New Harmony Cons.	White	129	2930	0–250	2906	39.2	0.20	34.6	0.731	12.10	10.0	0.807	11.90
	Maud	Wabash	177	2610	0–251	2655	38.0	0.30	32.5	0.733	12.10	9.6	0.811	11.84
	Thompsonville	Franklin	66	3110	0–252	3113	37.8	0.16	31.2	0.728	12.20	15.9	0.806	12.03
	(S.) Barnhill	Wayne	107	3390	0–253	3496	46.0	0.16	48.4	0.735	12.01	12.1	0.811	11.96
	Bungay	Hamilton	118	3340	0–254	3446	36.8	0.24	30.3	0.738	12.05	9.3	0.808	11.88
	Marcoe	Jefferson	58	2750	0–255	2800	23.2	0.54	5.8	0.787	11.69	3.1	0.820	11.60
	Belle Prairie	Hamilton	117	3460	0–258	3506	37.0	0.12	31.5	0.732	12.13	9.0	0.811	11.84
	Mason	Effingham	82	2490	0–262	2503	38.4	0.21	31.9	0.733	12.10	9.8	0.812	11.83
	Bone Gap	Edwards	129	3270	0–264	3325	40.5	0.33	33.1	0.728	12.16	8.9	0.820	11.71
	Dahlgren	Hamilton	135	3340	0–266	3359	39.2	0.16	34.2	0.731	12.10	9.6	0.812	11.83
	Bonpas	Richland	102	3130	0–281	3129	36.2	0.23	30.9	0.748	11.87	4.1	0.820	11.60
	Mayberry	Wayne	123	3380	0–288	3380	38.0	0.16	33.6	0.737	12.01	9.6	0.809	11.87
	Johnsonville	Wayne	107	3100	0–289	3215	38.0	0.17	33.8	0.738	11.89	9.7	0.812	11.83
	Parkersburg	Richland	104	3130	0–290	3129	38.0	0.31	32.9	0.734	12.07	9.7	0.814	11.80
	Springtown	Richland	98	3030	0–294	3033	39.8	0.24	34.5	0.735	12.03	9.5	0.811	11.84
	Ste. Marie	Jasper	80	2830	0–296	2935	40.2	0.14	35.5	0.731	12.08	9.7	0.809	11.87
	Inman N.	Gallatin	165	2870	0–301	3020	36.6	0.19	32.2	0.738	12.01	10.4	0.813	11.81
	Centerville	White	146	3340	0–303	3375	36.8	0.17	35.7	0.734	12.02	10.1	0.812	11.87
Oblong "sd."	Main	Crawford	159	1340	15082	1400	33.9	0.22	28.5	0.749	11.90	15.9	0.825	11.75
(McClosky Ave.)							37.8	0.22	32.7	0.741	11.97	9.3	0.814	11.79
St. Louis fm.	Ina	Jefferson	60	3000	0–241	3061	36.4	0.20	33.2	0.742	11.94	10.7	0.809	11.87
Osage group														
Carper sd.	Martinsville	Clark	154	1340	13658	1300	38.7	.....	29.8	0.748	11.89	13.6	.....	.....
	Martinsville	Clark	154	1340	14601	1600	38.5	0.23	32.7	0.734	12.08	16.0	0.819	11.84
(Carper Av.)							38.6	0.23	31.2	0.741	11.98	14.8	0.819	11.84
(Lower Miss. Av.)							37.8	0.22	32.6	0.741	11.97	9.5	0.813	11.79

TABLE 3—ANALYTICAL DATA FOR CRUDE OILS ARRANGED ACCORDING TO GEOLOGIC AGE OF PRODUCING STRATA—Continued

Oil-producing Strata	Pool or Field	County	Map Index Number (fig. 6)	Average Depth in feet	Lab. No.	Depth feet	A. P. I. Gravity	Sulfur per cent	GASOLINE			KEROSENE		
									Yield	Sp. G.	Character-ization Factor	Yield	Sp. G.	Character-ization factor
Devonian system														
Limestone—	Decatur**	Macon	.....	2020	14600	.....	40.3	0.32	36.8	0.731	12.08	15.8	0.827	11.73
undifferentiated	Sandoval	Marion	46	2920	0–156	2926	39.0	0.41	31.5	0.729	12.18	13.1	0.813	11.93
	Colmar-Plymouth	McDonough Hancock	1	450	0–159	450	37.6	0.38	26.6	0.729	12.25	16.6	0.806	12.03
	Sandoval	Marion	46	2920	0–188	3055	38.0	0.38	29.5	0.740	12.02	5.0	0.814	11.69
	Prairie Creek	Vigo, Ind.	.....	2074	0–196	2171	35.2	0.62	34.1	0.761	11.63	0.0	.....	.....
	Siosi	Sullivan,Ind	.....	2100	0–197	2245	46.0	0.64	50.5	0.733	11.99	5.5	0.821	11.59
	Salem	Marion	49	3340	0–198	3502	42.1	0.28	35.1	0.733	12.05	8.7	0.817	11.75
	Bartelso	Clinton	24	2420	0–200	2431	41.5	0.27	36.6	0.736	11.99	4.7	0.813	11.70
	Centralia	Clinton	27	2860	0–219	2915	37.4	0.38	33.0	0.734	12.07	9.8	0.810	11.85
	Boulder	Clinton	23	2585	0–286	2684	27.0	0.34	15.2	0.799	11.35	0.0	.....	.....
	Main	Crawford	178	2794	0–291	2965	37.0	0.43	32.4	0.738	12.01	4.1	0.815	11.67
Hoing sd.	Colmar-Plymouth	McDonough Hancock	1	450	0–228	520	35.2	0.29	29.1	0.750	11.87	10.2	0.814	11.80
	Colmar-Plymouth	McDonough Hancock	1	450	0–229	540	35.0	0.28	28.7	0.748	11.91	17.3	0.814	11.91
(Devonian Av.)....	.....	.....	.....	.....	.....	.....	37.8	0.39	32.2	0.743	11.95	8.5	0.815	11.79
Ordovician system														
"Trenton" ls.	Westfield	Clark	152	2260	0–183	.....	38.2	0.18	29.6	0.751	11.85	10.7	0.810	11.85
	Waterloo	Monroe	13	410	0–231	425	30.2	0.79	15.9	0.741	12.22	18.2	0.802	12.09
	Centralia	Clinton	27	4020	0–239	4068	43.2	0.28	34.3	0.725	12.21	17.9	0.802	12.09
(Ordovician Av.)...	.....	.....	.....	.....	.....	.....	37.2	0.42	26.6	0.739	12.09	15.6	0.805	12.01

** Not commercial production.

APPENDIX

CHEMICAL ANALYSES OF ILLINOIS CRUDE OILS

ARRANGED BY LABORATORY NUMBER

(See Table 3 for cross-index by age of producing formation)

Lab. No. O-209

Oil from: Paint Creek Stray
Chester (Upper Miss.) series
Depth 1579 feet

Fayette County
Sec. 9, T. 7 N., R. 3 E.
Louden field

General Characteristics

Specific gravity: 0.836
Sulfur, per cent: 0.24
Saybolt Universal Viscosity (100°F): 41.0

A. P. I. Gravity: 37.8°
Color: Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure — Barometer Reading 750.3 First drop, 81° F.

Fraction No.	Cut at °C	°F	Per cent cut	Sum per cent	Sp. gr. 60/60°F	°A.P.I. 60°F	S.U. visc. 100°F	Cloud Test °F	C.I.[1]	K[2]
1	50	122	3.5	3.5	0.675	78.1	—	—		
2	75	167	3.4	6.9	0.703	69.8	—	—	23	11.96
3	100	212	6.0	12.9	0.729	62.6	—	—	26	11.84
4	125	257	6.1	19.0	0.755	55.9	—	—	29	11.69
5	150	302	5.0	24.0	0.766	53.2	—	—	27	11.75
6	175	347	5.4	29.4	0.784	49.0	—	—	28	11.73
7	200	392	4.3	33.7	0.794	46.7	—	—	27	11.80
8	225	437	4.7	38.4	0.807	43.8	—	—	27	11.77
9	250	482	5.0	43.4	0.822	40.6	—	—	29	11.78
10	275	527	6.0	49.4	0.838	37.4	—	—	32	11.74
Vacuum distillation at 40 mm.										
11	200	392	4.4	53.8	0.854	34.2	40	10	36	11.69
12	225	437	5.5	59.3	0.863	32.5	47	30	36	11.73
13	250	482	4.0	63.3	0.874	30.4	57	50	38	11.73
14	275	527	5.0	68.3	0.883	28.8	85	65	39	11.81
15	300	572	5.2	73.5	0.896	26.4	160	85	42	11.79

Carbon residue of residuum, 9.4% — Carbon residue of crude, 2.6%

APPROXIMATE SUMMARY

	Per cent	Sp. gr.	°A.P.I.	Viscosity
Light gasoline	12.9	0.707	68.6	
Gasoline and naphtha	33.7	0.748	57.7	
Kerosene	9.7	0.815	42.1	
Gas oil	14.6	0.850	35.0	below 50
Non-viscous lub. dist.	8.8	0.867-0.885	31.7-28.4	50-100
Medium lub. dist.	6.7	0.885-0.903	28.4-25.2	100-200
Viscous lub. dist.	0.0			
Residuum	23.4	0.964	15.3	
Distillation loss	3.1			

[1]Correlation Index
[2]Characterization Factor

Lab. No. 0-210

Oil from: McClosky "lime"
Iowa (Lower Miss.) series
Depth 2983 feet

Clay County
Sec. 13, T. 3 N., R. 6 E.
Flora field

General Characteristics

Specific gravity: 0.839
Sulfur, per cent: 0 24
Saybolt Universal Viscosity (100°F): 41.0

A.P.I. Gravity: 37.2°
Color: Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure — Barometer Reading 748.9 First drop, 74°F

Fraction No.	Cut at °C	Cut at °F	Per cent cut	Sum per cent	Sp. gr. 60/60°F	°A.P.I. 60°F	S.U. visc. 100°F	Cloud Test °F	C.I.[1]	K[2]
1	50	122	2.4	2.4	0.647	87.2	—	—		
2	75	167	2.4	4.8	0.687	74.5	—	—	16	12.23
3	100	212	5.3	10.1	0.724	63.9	—	—	23	11.93
4	125	257	6.6	16.7	0.749	57.4	—	—	26	11.78
5	150	302	5.5	22.2	0.766	53.2	—	—	27	11.75
6	175	347	5.6	27.8	0.781	49.7	—	—	27	11.77
7	200	392	4.8	32.6	0.793	46.9	—	—	26	11.82
8	225	437	4.9	37.5	0.808	43.6	—	—	28	11.75
9	250	482	5.2	42.7	0.825	40.0	—	—	31	11.74
10	275	527	5.2	48.9	0.840	37.0	—	—	33	11.71
Vacuum distillation at 40 mm.										
11	200	392	4.8	53.7	0.856	33.8	40	5	37	11.67
12	225	437	5.8	59.5	0.868	31.5	45	20	38	11.65
13	250	482	4.6	64.1	0.881	29.1	64	45	41	11.65
14	275	527	5.1	69.2	0.890	27.5	90	60	42	11.70
15	300	572	6.0	75.2	0.901	25.6	170	75	45	11.71

Carbon residue of residuum, 10.5% — Carbon residue of crude, 2.9%

APPROXIMATE SUMMARY

	Per cent	Sp. gr.	°A.P.I.	Viscosity
Light gasoline	10.1	0.697	71.5	
Gasoline and naphtha	32.6	0.748	57.7	
Kerosene	10.1	0.817	41.7	
Gas oil	15.3	0.853	34.4	below 50
Non-viscous lub. dist.	9.4	0.872-0.892	30.8-27.1	50-100
Medium lub. dist.	6.8	0.892-0.905	27.1-24.9	100-200
Viscous lub. dist.	1.0	0.905-0.907	24.9-24.5	above 200
Residuum	23.3	0.958	16.2	
Distillation loss	1.5			

[1]Correlation Index
[2]Characterization Factor

Lab. No. O-211

Oil from: Bethel formation
Chester (Upper Miss.) series
Depth 1439 feet

Marion County
Sec. 18, T. 3 N., R. 1 E.
Fairman field

General Characteristics

Specific gravity: 0.849
Sulfur, per cent: 0.27
Saybolt Universal Viscosity (100°F): 41.0

A.P.I. Gravity: 35.2°
Color: Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure — Barometer Reading 748.9 First drop, 85°F

Fraction No.	Cut at °C	Cut at °F	Per cent cut	Sum per cent	Sp. gr. 60/60°F	°A.P.I. 60°F	S.U. visc. 100°F	Cloud Test °F	C.I.[1]	K[2]
1	50	122	3.1	3.1	0.637	90.6	—	—		
2	75	167	3.0	6.1	0.680	76.6	—	—	12	12.36
3	100	212	5.2	11.3	0.719	65.3	—	—	21	12.02
4	125	257	6.0	17.3	0.745	58.4	—	—	24	11.84
5	150	302	5.1	22.4	0.765	53.5	—	—	26	11.77
6	175	347	5.6	28.0	0.780	49.9	—	—	26	11.79
7	200	392	4.8	32.8	0.795	46.5	—	—	27	11.79
8	225	437	5.3	38.1	0.810	43.2	—	—	29	11.72
9	250	482	4.7	42.8	0.825	40.0	—	—	31	11.74
10	275	527	6.3	49.1	0.838	37.4	—	—	32	11.74
Vacuum distillation at 40 mm.										
11	200	392	4.3	53.4	0.850	35.0	40	10	34	11.75
12	225	437	4.8	58.2	0.863	32.5	46	30	36	11.73
13	250	482	4.7	62.9	0.875	30.2	61	50	38	11.72
14	275	527	4.6	67.5	0.890	27.5	85	65	46	11.62
15	300	572	5.7	73.2	0.897	26.3	150	85	46	11.66

Carbon residue of residuum, 10.5%

Carbon residue of crude, 2.8%

APPROXIMATE SUMMARY

	Per cent	Sp. gr.	°A.P.I.	Viscosity
Light gasoline	11.3	0.686	74.8	
Gasoline and naphtha	32.8	0.741	59.5	
Kerosene	10.0	0.817	41.7	
Gas oil	14.3	0.848	35.4	below 50
Non-viscous lub. dist.	9.4	0.866-0.892	31.9-27.1	50-100
Medium lub. dist.	6.7	0.892-0.901	27.1-25.6	100-200
Viscous lub. dist.	0.0			
Residuum	26.0	0.961	15.7	
Distillation loss	0.8			

[1]Correlation Index
[2]Characterization Factor

Lab. No. O-212

Oil from: St. Louis ls. and McClosky "lime"
Iowa (Lower Miss.) series
Depth 3068 feet

Franklin County
Sec. 19, T. 5 S., R. 3 E.
Whittington field

General Characteristics

Specific gravity: 0.837
Sulfur, per cent: 0.24
Saybolt Universal Viscosity (100°F): 39.0

A.P.I. Gravity: 37.6°
Color:Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure — Barometer Reading 758.4 First drop, 79°F

Fraction No.	Cut at °C	Cut at °F	Per cent cut	Sum per cent	Sp. gr. 60/60°F	°A.P.I. 60°F	S.U. visc. 100°F	Cloud Test °F	C.I.[1]	K[2]
1	50	122	2.8	2.8	0.647	87.2	—	—		
2	75	167	3.8	6.6	0.695	72.1	—	—	19	12.10
3	100	212	4.4	11.0	0.737	60.5	—	—	29	11.71
4	125	257	6.8	17.8	0.748	57.7	—	—	26	11.80
5	150	302	5.6	23.4	0.761	54.5	—	—	24	11.83
6	175	347	5.7	29.1	0.775	51.1	—	—	24	11.87
7	200	392	5.0	34.1	0.790	47.6	—	—	25	11.87
8	225	437	5.1	39.2	0.802	44.9	—	—	25	11.85
9	250	482	5.2	44.4	0.815	42.1	—	—	26	11.87
10	275	527	6.6	51.0	0.835	38.0	—	—	31	11.78
Vacuum distillation at 40 mm.										
11	200	392	3.9	54.9	0.851	34.8	39	10	34	11.74
12	225	437	5.1	60.0	0.863	32.5	45	30	36	11.73
13	250	482	5.0	65.0	0.870	31.1	56	50	36	11.79
14	275	527	4.7	69.7	0.882	28.9	80	65	39	11.82
15	300	572	6.0	75.7	0.895	26.6	150	80	42	11.80

Carbon residue of residuum, 8.1% — Carbon residue of crude, 2.1%

APPROXIMATE SUMMARY

	Per cent	Sp. gr.	°A.P.I.	Viscosity
Light gasoline	11.0	0.700	70.6	
Gasoline and naphtha	34.1	0.745	58.4	
Kerosene	10.3	0.809	43.4	
Gas oil	15.4	0.848	35.4	below 50
Non-viscous lub. dist.	9.1	0.866-0.886	31.9-28.2	50-100
Medium lub. dist.	6.8	0.866-0.902	28.2-25.4	100-200
Viscous lub. dist.	0.0			
Residuum	22.3	0.952	17.1	
Distillation loss	2.0			

[1]Correlation Index
[2]Characterization Factor

Lab. No. O-213

Oil from: Weiler sand
Chester (Upper Miss.) series
Depth 2592 feet

Richland County
Sec. 4, T. 4 N., R. 9 E.
Noble field

General Characteristics

Specific gravity: 0.852
Sulfur, per cent: 0.27
Saybolt Universal Viscosity (100°F): 48.0

A.P.I. Gravity: 34.6°
Color: Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure — Barometer Reading 753.2 First drop, 100°F

Fraction No.	Cut at °C	Cut at °F	Per cent cut	Sum per cent	Sp. gr. 60/60°F	°A.P.I. 60°F	S.U. visc. 100°F	Cloud Test °F	C.I.[1]	K[2]
1	50	122	0.5	0.5	0.678	77.2	—	—		
2	75	167	3.1	3.6	0.692	73.0	—	—	18	12.15
3	100	212	2.3	5.9	0.713	67.0	—	—	18	12.13
4	125	257	5.9	11.8	0.730	62.3	—	—	17	12.08
5	150	302	6.0	17.8	0.748	57.7	—	—	18	12.03
6	175	347	5.8	23.6	0.765	53.5	—	—	19	12.01
7	200	392	5.1	28.7	0.778	50.4	—	—	19	12.05
8	225	437	5.4	34.1	0.795	46.5	—	—	22	11.97
9	250	482	5.6	39.7	0.813	42.5	—	—	25	11.90
10	275	527	7.0	46.7	0.833	38.4	—	—	30	11.81
Vacuum distillation at 40 mm.										
11	200	392	3.9	50.6	0.842	36.6	39	5	30	11.86
12	225	437	5.7	56.3	0.852	34.6	44	25	31	11.88
13	250	482	5.6	61.9	0.865	32.1	57	45	34	11.86
14	275	527	4.9	66.8	0.874	30.4	85	70	39	11.82
15	300	572	6.2	73.0	0.890	27.5	150	85	43	11.76

Carbon residue of residuum, 10.7% — Carbon residue of crude, 3.3%

APPROXIMATE SUMMARY

	Per cent	Sp. gr.	°A.P.I.	Viscosity
Light gasoline	5.9	0.699	70.9	
Gasoline and naphtha	28.7	0.743	59.0	
Kerosene	11.0	0.804	44.5	
Gas oil	16.4	0.842	36.6	below 50
Non-viscous lub. dist.	9.5	0.858-0.877	33.4-29.8	50-100
Medium lub. dist.	7.4	0.877-0.899	29.8-25.9	100-200
Viscous lub. dist.	0.0			
Residuum	26.6	0.958	16.2	
Distillation loss	0.4			

[1]Correlation Index
[2]Characterization Factor

Lab. No. O-214

Oil from: McClosky "lime"
Iowa (Lower Miss.) series
Depth 2741 feet

Wabash County
Sec. 4, T. 1 N., R. 13 W.
Lancaster field

General Characteristics

Specific gravity: 0.826
Sulfur, per cent: 0.28
Saybolt Universal Viscosity (100°F): 40.0

A.P.I. Gravity: 39.8°
Color:Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure — Barometer Reading 749.8 First drop, 78°F

Fraction No.	Cut at °C	Cut at °F	Per cent cut	Sum per cent	Sp. gr. 60/60°F	°A.P.I. 60°F	S.U. visc. 100°F	Cloud Test °F	C.I.[1]	K[2]
1	50	122	4.7	4.7	0.630	93.1	—	—		
2	75	167	3.3	8.0	0.672	79.1	—	—	8.4	12.56
3	100	212	5.8	13.8	0.710	67.8	—	—	17	12.17
4	125	257	6.7	20.5	0.735	61.0	—	—	19	11.99
5	150	302	5.4	25.9	0.755	55.9	—	—	21	11.91
6	175	347	5.3	31.2	0.770	52.3	—	—	22	11.94
7	200	392	4.8	36.0	0.787	48.3	—	—	23	11.91
8	225	437	5.0	41.0	0.803	44.7	—	—	25	11.83
9	250	482	4.6	45.6	0.815	42.1	—	—	26	11.87
10	275	527	5.9	51.5	0.833	38.4	—	—	30	11.81
Vacuum distillation at 40 mm.										
11	200	392	4.1	55.6	0.847	35.6	39	below 5	32	11.80
12	225	437	4.3	59.9	0.854	34.2	45	30	32	11.86
13	250	482	4.4	64.3	0.864	32.3	54	45	33	11.87
14	275	527	4.5	68.8	0.878	29.7	90	65	40	11.77
15	300	572	5.3	74.1	0.885	28.4	160	85	41	11.82

Carbon residue of residuum, 7.1% — Carbon residue of crude, 1.9%

APPROXIMATE SUMMARY

	Per cent	Sp. gr.	°A.P.I.	Viscosity
Light gasoline	13.8	0.674	78.4	
Gasoline and naphtha	36.0	0.727	63.1	
Kerosene	9.6	0.809	43.4	
Gas oil	14.6	0.844	36.2	below 50
Non-viscous lub. dist.	7.1	0.860-0.878	33.0-29.7	50-100
Medium lub. dist.	6.8	0.878-0.889	29.7-27.7	100-200
Viscous lub. dist.	0.0			
Residuum	22.6	0.942	18.7	
Distillation loss	3.3			

[1] Correlation Index
[2] Characterization Factor

Lab. No. O-215

Oil from: Hardinsburg formation
Chester (Upper Miss.) series
Depth 2528 feet

White County
Sec. 25, T. 6 S., R. 8 E.
Iron field

General Characteristics

Specific gravity: 0.839
Sulfur, per cent: 0.29
Saybolt Universal Viscosity (100°F): 42.0

A.P.I. Gravity: 37.2°
Color: Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure — Barometer Reading 751.3 First drop, 81°F

Fraction No.	Cut at °C	Cut at °F	Per cent cut	Sum per cent	Sp. gr. 60/60°F	°A.P.I 60°F	S.U. visc. 100°F	Cloud Test °F	C.I.[1]	K[2]
1	50	122	3.6	3.6	0.628	93.8	—	—		
2	75	167	2.6	6.2	0.678	77.2	—	—	11	12.40
3	100	212	5.4	11.6	0.711	67.5	—	—	17	12.16
4	125	257	6.2	17.8	0.736	60.7	—	—	20	11.97
5	150	302	5.4	23.2	0.753	56.4	—	—	20	11.95
6	175	347	5.1	28.3	0.773	51.5	—	—	23	11.90
7	200	392	4.8	33.1	0.788	48.1	—	—	24	11.90
8	225	437	4.7	37.8	0.799	45.6	—	—	24	11.90
9	250	482	4.9	42.7	0.810	43.2	—	—	23	11.94
10	275	527	5.8	48.5	0.827	39.6	—	—	27	11.88
Vacuum distillation at 40 mm.										
11	200	392	4.4	52.9	0.843	36.4	39	5	30	11.84
12	225	437	4.7	57.6	0.853	34.4	46	30	31	11.87
13	250	482	4.7	62.3	0.867	31.7	56	50	35	11.83
14	275	527	4.6	66.9	0.881	29.1	90	70	41	11.73
15	300	572	5.8	72.7	0.890	27.5	160	90	43	11.76

Carbon residue of residuum, 10.7% — Carbon residue of crude, 3.1%

APPROXIMATE SUMMARY

	Per cent	Sp. gr.	°A.P.I.	Viscosity
Light gasoline	11.6	0.678	77.2	
Gasoline and naphtha	33.1	0.732	61.8	
Kerosene	9.6	0.805	44.3	
Gas oil	14.5	0.840	37.0	below 50
Non-viscous lub. dist.	8.1	0.859-0.882	33.2-28.9	50-100
Medium lub. dist.	7.4	0.882-0.895	28.9-26.6	100-200
Viscous lub. dist.	0.0			
Residuum	24.5	0.966	15.0	
Distillation loss	2.8			

[1]Correlation Index
[2]Characterization Factor

Lab. No. O-216

Oil from: McClosky "lime"
Iowa (Lower Miss.) series
Depth 2714 feet

Wabash County
Sec. 11, T. 2 S., R. 13 W
East Keensburg field

General Characteristics

Specific gravity: 0.837
Sulfur, per cent: 0.26
Saybolt Universal Viscosity (100°F): 42.0

A.P.I. Gravity: 37.6°
Color: Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure — Barometer Reading 747.9 First drop, 79°F

Fraction No.	Cut at °C	Cut at °F	Per cent cut	Sum per cent	Sp. gr. 60/60°F	°A.P.I. 60°F	S.U. visc. 100°F	Cloud Test °F	C.I.[1]	K[2]
1	50	122	3.3	3.3	0.628	93.8	—	—		
2	75	167	3.1	6.4	0.662	82.2	—	—	3.7	12.79
3	100	212	4.6	11.0	0.717	65.9	—	—	20	12.06
4	125	257	6.3	17.3	0.738	60.2	—	—	21	11.94
5	150	302	5.2	22.5	0.758	55.2	—	—	23	11.87
6	175	347	5.1	27.6	0.773	51.6	—	—	23	11.90
7	200	392	4.7	32.3	0.788	48.1	—	—	24	11.90
8	225	437	4.5	36.8	0.803	44.7	—	—	25	11.83
9	250	482	4.9	41.7	0.817	41.7	—	—	27	11.84
10	275	527	5.7	47.4	0.828	39.4	—	—	27	11.87
Vacuum distillation at 40 mm.										
11	200	392	4.2	51.6	0.842	36.6	40	10	30	11.86
12	225	437	5.1	56.7	0.850	35.0	45	30	30	11.91
13	250	482	4.9	61.6	0.863	32.5	59	55	33	11.88
14	275	527	4.5	66.1	0.872	30.8	85	70	38	11.84
15	300	572	6.0	72.1	0.882	28.9	160	85	39	11.86

Carbon residue of residuum, 5.2% — Carbon residue of crude, 1.6%

APPROXIMATE SUMMARY

	Per cent	Sp. gr.	°A.P.I.	Viscosity
Light gasoline	11.0	0.675	78.1	
Gasoline and naphtha	32.3	0.732	61.8	
Kerosene	9.4	0.810	43.2	
Gas oil	14.3	0.839	37.2	below 50
Non-viscous lub. dist.	8.9	0.855-0.874	34.0-30.4	50-100
Medium lub. dist.	6.9	0.874-0.887	30.4-28.0	100-200
Viscous lub. dist.	0.3	0.887-0.888	28.0-27.9	above 200
Residuum	27.0	0.938	19.4	
Distillation loss	0.9			

[1]Correlation Index
[2]Characterization Factor

Lab. No. O-217

Oil from: Rosiclare member
Iowa (Lower Miss.) series
Depth 3007 feet

Gallatin County
Sec. 25, T. 8 S., R. 9 E.
Extension to Inman field; well abd.

General Characteristics

Specific gravity: 0.835
Sulfur, per cent: 0.20
Saybolt Universal Viscosity (100°F): 41.0

A.P.I. Gravity: 38.0°
Color: Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure — Barometer Reading 752.1 First drop, 79°F

Fraction No.	Cut at °C	Cut at °F	Per cent cut	Sum per cent	Sp. gr. 60/60°F	°A.P.I. 60°F	S.U. visc. 100°F	Cloud Test °F	C.I.[1]	K[2]
1	50	122	3.2	3.2	0.632	92.4	—	—		
2	75	167	2.4	5.6	0.679	76.9	—	—	12	12.38
3	100	212	5.1	10.7	0.723	64.2	—	—	23	11.95
4	125	257	6.2	16.9	0.740	59.7	—	—	22	11.91
5	150	302	5.3	22.2	0.755	55.9	—	—	21	11.91
6	175	347	4.9	27.1	0.770	52.3	—	—	22	11.94
7	200	392	4.8	31.9	0.785	48.8	—	—	23	11.94
8	225	437	4.9	36.8	0.803	44.7	—	—	25	11.83
9	250	482	4.9	41.7	0.818	41.5	—	—	27	11.83
10	275	527	6.0	47.7	0.829	39.2	—	—	28	11.86
Vacuum distillation at 40 mm.										
11	200	392	3.8	51.5	0.838	37.4	40	10	28	11.92
12	225	437	5.1	56.6	0.850	35.0	46	25	30	11.91
13	250	482	5.1	61.7	0.860	33.0	57	55	31	11.92
14	275	527	4.8	66.5	0.872	30.8	90	75	38	11.84
15	300	572	6.5	73.0	0.880	29.3	140	85	38	11.88

Carbon residue of residuum, 4.7%

Carbon residue of crude, 1.4%

APPROXIMATE SUMMARY

	Per cent	Sp. gr.	°A.P.I.	Viscosity
Light gasoline	10.7	0.686	74.8	
Gasoline and naphtha	31.9	0.736	60.8	
Kerosene	9.8	0.811	43.0	
Gas oil	14.3	0.838	37.4	below 50
Non-viscous lub. dist.	9.2	0.854-0.873	34.2-30.6	50-100
Medium lub. dist.	7.8	0.873-0.885	30.6-28.4	100-200
Viscous lub. dist.	0.0			
Residuum	26.0	0.933	20.2	
Distillation loss	1.0			

[1]Correlation Index
[2]Characterization Factor

Lab. No. O-218

Oil from: McClosky "lime"
Iowa (Lower Miss.) series
Depth 3175 feet

Edwards County
Sec. 24, T. 2 S., R. 10 E.
Albion field

General Characteristics

Specific gravity: 0.825
Sulfur, per cent: 0.18
Saybolt Universal Viscosity (100°F): 40.0

A.P.I. Gravity: 40.0°
Color: Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure — Barometer Reading 749.7 First drop, 80°F

Fraction No. 1	Cut at °C	°F	Per cent cut	Sum per cent	Sp. gr. 60/60°F	°A.P.I. 60°F	S.U. visc. 100°F	Cloud Test °F	C.I.[1]	K[2]
1	50	122	4.7	4.7	0.637	90.6	—	—		
2	75	167	3.9	8.6	0.672	79.1	—	—	8.4	12.56
3	100	212	5.4	14.0	0.722	64.5	—	—	22	11.96
4	125	257	6.7	20.7	0.743	59.0	—	—	23	11.86
5	150	302	5.4	26.1	0.760	54.7	—	—	24	11.84
6	175	347	5.3	31.4	0.775	51.1	—	—	24	11.87
7	200	392	4.5	35.9	0.790	47.6	—	—	25	11.87
8	225	437	4.7	40.6	0.805	44.3	—	—	26	11.80
9	250	482	4.9	45.5	0.818	41.5	—	—	27	11.83
10	275	527	5.7	51.2	0.832	38.6	—	—	29	11.82
Vacuum distillation at 40 mm.										
11	200	392	4.0	55.2	0.843	36.4	40	5	30	11.84
12	225	437	4.5	59.7	0.853	34.4	47	25	31	11.87
13	250	482	4.2	63.9	0.867	31.7	65	45	35	11.83
14	275	527	3.9	67.8	0.876	30.0	95	65	39	11.81
15	300	572	5.3	73.1	0.890	27.5	180	80	43	11.76

Carbon residue of residuum, 6.3% — Carbon residue of crude, 1.7%

APPROXIMATE SUMMARY

	Per cent	Sp. gr.	°A.P.I.	Viscosity
Light gasoline	14.0	0.680	76.6	
Gasoline and naphtha	35.9	0.731	62.1	
Kerosene	9.6	0.812	42.8	
Gas oil	12.7	0.840	37.0	below 50
Non-viscous lub. dist.	8.0	0.855-0.877	34.0-29.8	50-100
Medium lub. dist.	5.4	0.877-0.893	29.8-27.0	100-200
Viscous lub. dist.	1.5	0.893-0.898	27.0-26.1	above 200
Residuum	23.2	0.945	18.2	
Distillation loss	3.7			

[1]Correlation Index
[2]Characterization Factor

Lab. No. O-219

Oil from: Undifferentiated limestone
Devonian system
Depth 2915 feet

Clinton County
Sec. 13, T. 1 N., R. 1 W.
Centralia field

General Characteristics

Specific gravity: 0.838
Sulfur, per cent: 0.38
Saybolt Universal Viscosity (100°F): 42.0

A.P.I. Gravity: 37.4°
Color: Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure — Barometer Reading 748.7 First drop, 89°F

Fraction No.	Cut at °C	Cut at °F	Per cent cut	Sum per cent	Sp. gr. 60/60°F	°A.P.I. 60°F	S.U. visc. 100°F	Cloud Test °F	C.I.[1]	K[2]
1	50	122	2.0	2.0	0.632	92.4	—	—		
2	75	167	4.2	6.2	0.675	78.1	—	—	9.8	12.48
3	100	212	5.8	12.0	0.715	66.4	—	—	19	12.10
4	125	257	4.8	16.8	0.735	61.0	—	—	19	11.99
5	150	302	5.8	22.6	0.750	57.2	—	—	19	12.00
6	175	347	5.6	28.2	0.768	52.8	—	—	21	11.97
7	200	392	4.8	33.0	0.790	47.6	—	—	25	11.87
8	225	437	4.9	37.9	0.804	44.5	—	—	26	11.81
9	250	482	4.9	42.8	0.815	42.1	—	—	26	11.87
10	275	527	6.6	49.4	0.828	39.4	—	—	27	11.87
Vacuum distillation at 40 mm.										
11	200	392	4.1	53.5	0.840	37.0	40	5	29	11.89
12	225	437	5.1	58.6	0.853	34.4	47	25	31	11.87
13	250	482	4.8	63.4	0.863	32.5	61	50	33	11.88
14	275	527	4.4	67.8	0.876	30.0	85	70	39	11.81
15	300	572	6.4	74.2	0.885	28.4	170	90	41	11.82

Carbon residue of residuum, 6.7% — Carbon residue of crude, 1.9%

APPROXIMATE SUMMARY

	Per cent	Sp. gr.	°A.P.I.	Viscosity
Light gasoline	12.0	0.687	74.5	
Gasoline and naphtha	33.0	0.734	61.3	
Kerosene	9.8	0.810	43.2	
Gas oil	14.4	0.837	37.6	below 50
Non-viscous lub. dist.	9.4	0.855-0.878	34.0-29.7	50-100
Medium lub. dist.	6.2	0.878-0.888	29.7-27.9	100-200
Viscous lub. dist.	1.4	0.888-0.890	27.9-27.5	above 200
Residuum	24.8	0.942	18.7	
Distillation loss	1.0			

[1]Correlation Index
[2]Characterization Factor

Lab. No. O-220

Oil from: Cypress formation
Chester (Upper Miss.) series
Depth 2700 feet

Hamilton County
Sec. 6, T. 6 S., R. 7 E.
Dale field

General Characteristics

Specific gravity: 0.837
Sulfur, per cent: 0.25
Saybolt Universal Viscosity (100°F): 42.0

A.P.I. Gravity: 37.6°
Color: Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure — Barometer Reading 750.3 First drop, 88°F

Fraction No.	Cut at °C	Cut at °F	Per cent cut	Sum per cent	Sp. gr. 60/60°F	°A.P.I. 60°F	S.U. visc. 100°F	Cloud Test °F	C.I.[1]	K[2]
1	50	122	3.6	3.6	0.634	91.7	—	—		
2	75	167	3.1	6.7	0.668	80.3	—	—	6.5	12.65
3	100	212	5.4	12.1	0.716	66.1	—	—	19	12.08
4	125	257	5.6	17.7	0.735	61.0	—	—	19	11.99
5	150	302	5.4	23.1	0.753	56.4	—	—	20	11.95
6	175	347	5.3	28.4	0.768	52.8	—	—	21	11.97
7	200	392	4.5	32.9	0.786	48.5	—	—	23	11.92
8	225	437	4.7	37.6	0.801	45.2	—	—	24	11.87
9	250	482	4.7	42.3	0.816	41.9	—	—	26	11.86
10	275	527	6.0	48.3	0.825	40.0	—	—	26	11.91
Vacuum distillation at 40 mm.										
11	200	392	4.0	52.3	0.843	36.4	39	10	30	11.84
12	225	437	4.6	56.9	0.853	34.4	45	30	31	11.87
13	250	482	4.7	61.6	0.863	32.5	57	55	33	11.88
14	275	527	4.6	66.2	0.876	30.0	85	75	39	11.81
15	300	572	5.6	71.8	0.885	28.4	150	90	41	11.82

Carbon residue of residuum, 9.0%

Carbon residue of crude, 2.6%

APPROXIMATE SUMMARY

	Per cent	Sp. gr.	°A.P.I.	Viscosity
Light gasoline	12.1	0.679	76.9	
Gasoline and naphtha	32.9	0.730	62.3	
Kerosene	15.4	0.815	42.1	
Gas oil	8.3	0.848	35.4	below 50
Non-viscous lub. dist.	8.5	0.857-0.878	33.6-29.7	50-100
Medium lub. dist.	6.7	0.878-0.890	29.7-27.7	100-200
Viscous lub. dist.	0.0			
Residuum	25.4	0.956	16.5	
Distillation loss	2.8			

[1]Correlation Index
[2]Characterization Factor

Lab. No. O-221

Oil from: McClosky "lime"
Iowa (Lower Miss.) series
Depth 2847 feet

Jasper County
Sec. 33, T. 6 N., R. 10 E.
Boos field

General Characteristics

Specific gravity: 0.827
Sulfur, per cent: 0.26
Saybolt Universal Viscosity (100°F): 39.0

A.P.I. Gravity: 39.6°
Color: Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure — Barometer Reading 752.4 First drop, 85°F

Fraction No.	Cut at °C	Cut at °F	Per cent cut	Sum per cent	Sp. gr. 60/60°F	°A.P.I. 60°F	S.U. visc. 100°F	Cloud Test °F	C.I.[1]	K[2]
1	50	122	4.4	4.4	0.637	90.6	—	—		
2	75	167	3.5	7.9	0.674	78.4	—	—	9.4	12.50
3	100	212	5.7	13.6	0.710	67.8	—	—	17	12.17
4	125	257	6.5	20.1	0.734	61.3	—	—	19	12.00
5	150	302	5.6	25.7	0.752	56.7	—	—	20	11.97
6	175	347	5.3	31.0	0.768	52.8	—	—	21	11.97
7	200	392	4.8	35.8	0.785	48.8	—	—	23	11.94
8	225	437	4.8	40.6	0.800	45.4	—	—	24	11.89
9	250	482	5.0	45.6	0.813	42.6	—	—	25	11.90
10	275	527	5.5	51.1	0.824	40.2	—	—	25	11.92
Vacuum distillation at 40 mm.										
11	200	392	4.3	55.4	0.840	37.0	40	below 5	29	11.89
12	225	437	4.5	59.9	0.850	35.0	45	20	30	11.91
13	250	482	4.4	64.3	0.863	32.5	57	45	33	11.88
14	275	527	4.2	68.5	0.876	30.0	85	70	39	11.81
15	300	572	5.3	73.8	0.885	28.4	160	85	41	11.82

Carbon residue of residuum, 6.3% — Carbon residue of crude, 1.7%

APPROXIMATE SUMMARY

	Per cent	Sp. gr.	°A.P.I.	Viscosity
Light gasoline	13.6	0.677	77.5	
Gasoline and naphtha	35.8	0.727	63.1	
Kerosene	15.3	0.813	42.6	
Gas oil	8.4	0.845	36.0	below 50
Non-viscous lub. dist.	7.8	0.855-0.878	34.0-29.7	50-100
Medium lub. dist.	6.5	0.878-0.890	29.7-27.5	100-200
Viscous lub. dist.	0.0			
Residuum	22.7	0.943	18.6	
Distillation loss	3.5			

[1]Correlation Index
[2]Characterization Factor

Lab. No. O-223

Oil from: McClosky-Rosiclare
Iowa (Lower Miss.) series
Depth 3505 feet

White County
Sec. 28, T. 3 S., R. 9 E.
Burnt Prairie field

General Characteristics

Specific gravity: 0.840
Sulfur, per cent: 0.28
Saybolt Universal Viscosity (100°F): 41.0

A.P.I. Gravity: 37.0°
Color: Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure — Barometer Reading 751.6 First drop, 83°F

Fraction No.	Cut at °C	Cut at °F	Per cent cut	Sum per cent	Sp. gr. 60/60°F	°A.P.I. 60°F	S.U. visc. 100°F	Cloud Test °F	C.I.[1]	K[2]
1	50	122	2.7	2.7	0.638	90.3	—	—		
3	75	167	3.0	5.7	0.680	76.6	—	—	12	12.36
3	100	212	5.5	11.2	0.715	66.4	—	—	19	12.10
4	125	257	6.8	18.0	0.738	60.2	—	—	21	11.94
5	150	302	5.9	23.9	0.753	56.4	—	—	20	11.95
6	175	347	5.7	29.6	0.770	52.3	—	—	22	11.94
7	200	392	5.1	34.7	0.788	48.1	—	—	24	11.90
8	225	437	5.2	39.9	0.803	44.7	—	—	25	11.83
9	250	482	5.3	45.2	0.815	42.1	—	—	26	11.87
10	275	527	6.3	51.5	0.829	39.2	—	—	28	11.86
Vacuum distillation at 40 mm.										
11	200	392	4.6	56.1	0.842	36.6	40	5	30	11.86
12	225	437	5.1	61.2	0.852	34.6	46	30	31	11.88
13	250	482	4.5	65.7	0.865	32.1	60	50	34	11.86
14	275	527	4.5	70.2	0.876	30.0	90	70	39	11.81
15	300	572	5.6	75.8	0.886	28.2	160	85	42	11.80

Carbon residue of residuum, 6.1% — Carbon residue of crude, 1.7%

APPROXIMATE SUMMARY

	Per cent	Sp. gr.	°A.P.I.	Viscosity
Light gasoline	11.2	0.687	74.5	
Gasoline and naphtha	34.7	0.737	60.5	
Kerosene	10.5	0.809	43.4	
Gas oil	15.0	0.839	37.2	below 50
Non-viscous lub. dist.	8.5	0.856-0.878	33.8-29.7	50-100
Medium lub. dist.	7.1	0.878-0.892	29.7-27.1	100-200
Viscous lub. dist.	0.0			
Residuum	24.1	0.944	18.4	
Distillation loss	0.1			

[1]Correlation Index
[2]Characterization Factor

Lab. No. O-224

Oil from: Waltersburg formation
Chester (Upper Miss.) series
Depth 2209 feet

Posey County, Indiana
Sec. 9, T. 15 S., R. 14 W.
New Harmony field

General Characteristics

Specific gravity: 0.837
Sulfur, per cent: 0.40
Saybolt Universal Viscosity (100°F): 41.0

A.P.I. Gravity: 37.6°
Color: Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure — Barometer Reading 749.6 First drop, 79°F

Fraction No.	Cut at °C	Cut at °F	Per cent cut	Sum per cent	Sp. gr. 60/60°F	°A.P.I. 60°F	S.U. visc. 100°F	Cloud Test °F	C.I.[1]	K[2]
1	50	122	3.7	3.7	0.632	92.4	—	—		
2	75	167	3.1	6.8	0.674	78.4	—	—	9.4	12.50
3	100	212	5.6	12.4	0.714	66.7	—	—	18	12.11
4	125	257	6.5	18.9	0.737	60.5	—	—	20	11.96
5	150	302	5.5	24.4	0.753	56.4	—	—	20	11.95
6	175	347	5.1	29.5	0.770	52.3	—	—	22	11.94
7	200	392	4.7	34.2	0.785	48.8	—	—	23	11.94
8	225	437	4.9	39.1	0.800	45.4	—	—	24	11.89
9	250	482	5.0	44.1	0.818	41.5	—	—	27	11.83
10	275	527	6.2	50.3	0.830	39.0	—	—	28	11.84
Vacuum distillation at 40 mm.										
11	200	392	4.0	54.3	0.843	36.4	40	10	30	11.84
12	225	437	4.9	59.2	0.853	34.4	45	30	31	11.87
13	250	482	4.9	64.1	0.865	32.1	60	55	34	11.86
14	275	527	4.8	68.9	0.876	30.0	90	75	39	11.81
15	300	572	5.8	74.7	0.887	28.0	170	90	42	11.79

Carbon residue of residuum, 9.9% — Carbon residue of crude, 2.6%

APPROXIMATE SUMMARY

	Per cent	Sp. gr.	°A.P.I.	Viscosity
Light gasoline	12.4	0.680	76.6	
Gasoline and naphtha	34.2	0.730	62.3	
Kerosene	9.9	0.809	43.4	
Gas oil	14.3	0.840	37.0	below 50
Non-viscous lub. dist.	8.7	0.857-0.877	33.6-29.8	50-100
Medium lub. dist.	6.7	0.877-0.891	29.8-27.3	100-200
Viscous lub. dist.	0.9	0.891-0.893	27.3-27.0	above 200
Residuum	21.9	0.972	14.1	
Distillation loss	3.4			

[1]Correlation Index
[2]Characterization Factor

Lab. No. O-225

Oil from: McClosky "lime"
Iowa (Lower Miss.) series
Depth 3036 feet

Richland County
Sec. 7, T. 2 N., R. 9 E.
Schnell field

General Characteristics

Specific gravity: 0.840
Sulfur, per cent: 0.19
Saybolt Universal Viscosity (100°F): 44.0

A.P.I. Gravity: 37.0°
Color: Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure — Barometer Reading 744.1 First drop, 90°F

Fraction No.	Cut at °C	Cut at °F	Per cent cut	Sum per cent	Sp. gr. 60/60°F	°A.P.I. 60°F	S.U. visc. 100°F	Cloud Test °F	C.I.[1]	K[2]
1	50	122	2.1	2.1	0.651	85.9	—	—		
2	75	167	2.2	4.3	0.680	76.6	—	—	12	12.36
3	100	212	5.1	9.4	0.725	63.7	—	—	24	11.91
4	125	257	5.8	15.2	0.750	57.2	—	—	27	11.77
5	150	302	5.3	20.5	0.765	53.5	—	—	26	11.77
6	175	347	5.7	26.2	0.780	49.9	—	—	26	11.79
7	200	392	4.8	31.0	0.795	46.5	—	—	27	11.79
8	225	437	5.0	36.0	0.810	43.2	—	—	29	11.72
9	250	482	5.4	41.4	0.825	40.0	—	—	31	11.74
10	275	527	6.1	47.5	0.840	37.0	—	—	33	11.71
Vacuum distillation at 40 mm.										
11	200	392	4.6	52.1	0.850	35.0	40	10	34	11.75
12	225	437	4.4	56.5	0.860	33.0	47	30	35	11.77
13	250	482	4.3	60.8	0.870	31.1	65	50	36	11.79
14	275	527	4.3	65.1	0.885	28.4	95	70	43	11.67
15	300	572	6.2	71.3	0.897	26.3	170	85	46	11.66

Carbon residue of residuum, 5.3% — Carbon residue of crude, 1.7%

APPROXIMATE SUMMARY

	Per cent	Sp. gr.	°A.P.I.	Viscosity
Light gasoline	9.4	0.698	71.2	
Gasoline and naphtha	31.0	0.749	57.4	
Kerosene	10.4	0.818	41.5	
Gas oil	13.6	0.847	35.6	below 50
Non-viscous lub. dist.	8.3	0.862-0.886	32.7-28.2	50-100
Medium lub. dist.	7.1	0.886-0.902	28.2-25.4	100-200
Viscous lub. dist.	0.9	0.902-0.904	25.4-25.0	above 200
Residuum	28.2	0.935	19.8	
Distillation loss	0.5			

[1]Correlation Index
[2]Characterization Factor

Lab. No. O-226

Oil from: Rosiclare member
Iowa (Lower Miss.) series
Depth 2408 feet

Wabash County
Sec. 19, T. 1 S., R. 12 W
Mt. Carmel field

General Characteristics

Specific gravity: 0.842
Sulfur, per cent: 0.36
Saybolt Universal Viscosity (100°F): 43.0

A.P.I. Gravity: 36.6°
Color: Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure — Barometer Reading 744.7 First drop, 89°F

Fraction No.	Cut at °C	Cut at °F	Per cent cut	Sum per cent	Sp. gr. 60/60°F	°A.P.I. 60°F	S.U. visc. 100°F	Cloud Test °F	C.I.[1]	K[2]
1	50	122	2.9	2.9	0.642	88.9	—	—		
2	75	167	2.8	5.7	0.687	74.5	—	—	16	12.23
3	100	212	5.4	11.1	0.728	62.9	—	—	25	11.86
4	125	257	6.4	17.5	0.753	56.4	—	—	28	11.72
5	150	302	5.3	22.8	0.768	52.8	—	—	27	11.72
6	175	347	4.4	27.2	0.789	47.8	—	—	31	11.66
7	200	392	4.3	31.5	0.805	44.3	—	—	32	11.62
8	225	437	4.9	36.4	0.820	41.1	—	—	33	11.58
9	250	482	5.1	41.5	0.830	39.0	—	—	33	11.68
10	275	527	7.0	48.5	0.840	37.0	—	—	33	11.71
Vacuum distillation at 40 mm.										
11	200	392	4.5	53.0	0.850	35.0	40	10	34	11.75
12	225	437	5.0	58.0	0.860	33.0	47	30	35	11.77
13	250	482	5.0	63.0	0.873	30.6	59	50	37	11.75
14	275	527	5.6	68.6	0.885	28.4	90	70	43	11.67
15	300	572	5.9	74.5	0.895	26.6	160	85	45	11.70

Carbon residue of residuum, 6.1% — Carbon residue of crude, 1.8%

APPROXIMATE SUMMARY

	Per cent	Sp. gr.	°A.P.I.	Viscosity
Light gasoline	11.1	0.695	72.1	
Gasoline and naphtha	31.5	0.747	57.9	
Kerosene	4.9	0.820	41.1	
Gas oil	20.3	0.843	36.4	below 50
Non-viscous lub. dist.	9.9	0.863-0.886	32.5-28.2	50-100
Medium lub. dist.	7.9	0.886-0.900	28.2-25.7	100-200
Viscous lub. dist.	0.0			
Residuum	25.5	0.948	17.8	
Distillation loss	0.0			

[1]Correlation Index
[2]Characterization Factor

Lab. No. O-227

Oil from: McClosky "lime"
Iowa (Lower Miss.) series
Depth 3090 feet

Richland County
Sec. 27, T. 4 N., R. 10 E.
Olney field

General Characteristics

Specific gravity: 0.839
Sulfur, per cent: 0.19
Saybolt Universal Viscosity (100°F): 42.2

A.P.I. Gravity: 37.2°
Color: Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure — Barometer Reading 748.3 First drop, 87°F

Fraction No.	Cut at °C	Cut at °F	Per cent cut	Sum per cent	Sp. gr. 60/60°F	°A.P.I. 60°F	S.U. visc. 100°F	Cloud Test °F	C.I.[1]	K[2]
1	50	122	2.4	2.4	0.649	86.5	—	—		
2	75	167	2.3	4.7	0.679	76.9	—	—	12	12.38
3	100	212	4.6	9.3	0.720	65.0	—	—	21	12.00
4	125	257	6.1	15.4	0.749	57.4	—	—	26	11.78
5	150	302	5.9	21.3	0.763	54.0	—	—	25	11.80
6	175	347	6.0	27.3	0.780	49.9	—	—	26	11.79
7	200	392	5.2	32.5	0.795	46.5	—	—	27	11.79
8	225	437	5.4	37.9	0.808	43.6	—	—	28	11.75
9	250	482	5.2	43.1	0.823	40.4	—	—	30	11.77
10	275	527	6.1	49.2	0.835	38.0	—	—	31	11.78
Vacuum distillation at 40 mm.										
11	200	392	4.5	53.7	0.849	35.2	39	10	33	11.77
12	225	437	4.9	58.6	0.863	32.5	45	30	36	11.73
13	250	482	4.8	63.4	0.875	30.2	58	50	38	11.72
14	275	527	4.7	68.1	0.885	28.4	95	70	43	11.67
15	300	572	5.9	74.0	0.896	26.4	170	90	46	11.67

Carbon residue of residuum, 5.3% — Carbon residue of crude, 1.5%

APPROXIMATE SUMMARY

	Per cent	Sp. gr.	°A.P.I.	Viscosity
Light gasoline	9.3	0.692	73.0	
Gasoline and naphtha	32.5	0.748	57.7	
Kerosene	10.6	0.815	42.1	
Gas oil	15.0	0.847	35.6	below 50
Non-viscous lub. dist.	8.1	0.868-0.886	31.5-28.2	50-100
Medium lub. dist.	7.0	0.886-0.900	28.2-25.7	100-200
Viscous lub. dist.	0.8	0.900-0.902	25.7-25.4	above 200
Residuum	25.9	0.935	19.8	
Distillation loss	0.1			

[1]Correlation Index
[2]Characterization Factor

Lab. No. O-228

Oil from: Hoing sand
Devonian system
Depth 520 feet

McDonough County
Sec. 19, T. 4 N., R. 4 W.
Plymouth-Colmar field

General Characteristics

Specific gravity: 0.849
Sulfur, per cent: 0.29
Saybolt Universal Viscosity (100°F): 46.1

A.P.I. Gravity: 35.2°
Color: Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure — Barometer Reading 747.9 First drop, 95°F

Fraction No.	Cut at °C	Cut at °F	Per cent cut	Sum per cent	Sp. gr. 60/60°F	°A.P.I. 60°F	S.U. visc. 100°F	Cloud Test °F	C.I.[1]	K[2]
1	50	122	1.4	1.4	0.649	86.5	—	—		
2	75	167	2.3	3.7	0.680	76.6	—	—	12	12.36
3	100	212	3.0	6.7	0.719	65.3	—	—	21	12.02
4	125	257	6.5	13.2	0.744	58.7	—	—	24	11.85
5	150	302	5.6	18.8	0.762	54.2	—	—	25	11.81
6	175	347	5.3	24.1	0.778	50.4	—	—	25	11.82
7	200	392	5.0	29.1	0.793	46.9	—	—	26	11.82
8	225	437	5.2	34.3	0.808	43.6	—	—	28	11.75
9	250	482	5.0	39.3	0.820	41.1	—	—	28	11.81
10	275	527	7.0	46.3	0.833	38.4	—	—	30	11.81
Vacuum distillation at 40 mm.										
11	200	392	5.1	51.4	0.845	36.0	40	15	31	11.82
12	225	437	5.3	56.7	0.855	34.0	46	30	32	11.84
13	250	482	5.6	62.3	0.865	32.1	59	55	34	11.86
14	275	527	5.3	67.6	0.882	28.9	90	65	43	11.68
15	300	572	5.7	73.3	0.897	26.3	150	80	46	11.66

Carbon residue of residuum, 8.8% — Carbon residue of crude, 2.7%

APPROXIMATE SUMMARY

	Per cent	Sp. gr.	°A.P.I.	Viscosity
Light gasoline	6.7	0.691	73.3	
Gasoline and naphtha	29.1	0.750	57.2	
Kerosene	10.2	0.814	42.3	
Gas oil	16.5	0.842	36.6	below 50
Non-viscous lub. dist.	10.1	0.858-0.885	33.4-28.4	50-100
Medium lub. dist.	7.4	0.885-0.904	28.4-25.0	100-200
Viscous lub. dist.	0.0			
Residuum	26.7	0.957	16.4	
Distillation loss	0.0			

[1]Correlation Index
[2]Characterization Factor

Lab. No. O-229

Oil from: Hoing sand
Devonian system
Depth 540 feet

McDonough County
Sec. 15, T. 4 N., R. 4 W.
Plymouth-Colmar field

General Characteristics

Specific gravity: 0.850
Sulfur, per cent: 0.28
Saybolt Universal Viscosity (100°F): 47.0

A.P.I. Gravity: 35.0°
Color: Brown

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure — Barometer Reading 746.5 First drop, 96°F

Fraction No.	Cut at °C	Cut at °F	Per cent cut	Sum per cent	Sp. gr. 60/60°F	°A.P.I. 60°F	S.U. visc. 100°F	Cloud Test °F	C.I.[1]	K[2]
1	50	122	1.1	1.1	0.650	86.2	—	—		
2	75	167	2.1	3.2	0.677	77.5	—	—	11	12.43
3	100	212	3.0	6.2	0.715	66.4	—	—	19	12.10
4	125	257	5.9	12.1	0.743	59.0	—	—	23	11.86
5	150	302	5.9	18.0	0.757	55.4	—	—	22	11.88
6	175	347	5.4	23.4	0.770	52.3	—	—	22	11.94
7	200	392	5.3	28.7	0.787	48.3	—	—	23	11.91
8	225	437	5.3	34.0	0.800	45.4	—	—	24	11.89
9	250	482	5.4	39.4	0.813	42.6	—	—	25	11.90
10	275	527	6.6	46.0	0.825	40.0	—	—	26	11.91
Vacuum distillation at 40 mm.										
11	200	392	5.1	51.1	0.835	38.0	39	15	27	11.96
12	225	437	5.4	56.5	0.845	36.0	45	35	28	11.99
13	250	482	5.4	61.9	0.860	33.0	57	50	31	11.92
14	275	527	5.7	67.6	0.881	29.1	85	65	41	11.75
15	300	572	5.9	73.5	0.897	26.3	160	75	46	11.66

Carbon residue of residuum, 8.2% Carbon residue of crude, 2.5%

APPROXIMATE SUMMARY

	Per cent	Sp. gr.	°A.P.I.	Viscosity
Light gasoline	6.2	0.691	73.3	
Gasoline and naphtha	28.7	0.748	57.7	
Kerosene	17.3	0.814	42.3	
Gas oil	10.1	0.840	37.0	below 50
Non-viscous lub. dist.	9.9	0.851-0.884	34.8-28.6	50-100
Medium lub. dist.	7.5	0.884-0.905	28.6-24.9	100-200
Viscous lub. dist.	0.0			
Residuum	26.5	0.958	16.2	
Distillation loss	0.0			

[1]Correlation Index
[2]Characterization Factor

Lab. No. O-230

Oil from: Bethel formation
Chester (Upper Miss.) series
Depth 1370 feet

Washington County
Sec. 19, T. 3 S., R. 1 W.
Dubois field

General Characteristics

Specific gravity: 0.871
Sulfur, per cent: 0.26
Saybolt Universal Viscosity (100°F): 54.0

A.P.I. Gravity: 31.0°
Color: Brown

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure — Barometer Reading 747.7 First drop, 90°F

Fraction No.	Cut at °C	Cut at °F	Per cent cut	Sum per cent	Sp. gr. 60/60°F	°A.P.I. 60°F	S.U. visc. 100°F	Cloud Test °F	C.I.[1]	K[2]
1	50	122	1.4	1.4	0.675	78.1	—	—		
2	75	167	1.4	2.8	0.714	66.7	—	—	28	11.76
3	100	212	3.8	6.6	0.750	57.2	—	—	36	11.52
4	125	257	6.2	12.8	0.757	55.4	—	—	30	11.66
5	150	302	5.3	18.1	0.770	52.3	—	—	28	11.69
6	175	347	5.1	23.2	0.785	48.8	—	—	29	11.71
7	200	392	4.3	27.5	0.805	44.3	—	—	32	11.62
8	225	437	4.6	32.1	0.823	40.4	—	—	35	11.54
9	250	482	5.1	37.2	0.838	37.4	—	—	37	11.58
10	275	527	6.6	43.8	0.850	35.0	—	—	38	11.59
Vacuum distillation at 40 mm.										
11	200	392	4.8	48.6	0.860	33.0	41	below 5	38	11.62
12	225	437	5.1	53.7	0.870	31.1	51	"	39	11.63
13	250	482	5.0	58.7	0.880	29.3	72	"	41	11.66
14	275	527	5.1	63.8	0.892	27.1	115	"	47	11.59
15	300	572	7.0	70.8	0.902	25.4	250	15	49	11.60

Carbon residue of residuum, 12.1%

Carbon residue of crude, 3.8%

APPROXIMATE SUMMARY

	Per cent	Sp. gr.	°A.P.I.	Viscosity
Light gasoline	6.6	0.726	63.4	
Gasoline and naphtha	27.5	0.765	53.5	
Kerosene	4.6	0.823	40.4	
Gas oil	18.6	0.851	34.8	below 50
Non-viscous lub. dist.	8.9	0.869-0.888	31.3-27.9	50-100
Medium lub. dist.	5.4	0.888-0.898	27.9-26.1	100-200
Viscous lub. dist.	5.8	0.898-0.908	26.1-24.3	above 200
Residuum	27.8	0.974	13.8	
Distillation loss	1.4			

[1]Correlation Index
[2]Characterization Factor

Lab. No. O-231

Oil from: "Trenton" limestone
Ordovician system
Depth 425 feet

Monroe County
Sec. 35, T. 1 S., R. 10 W.
Waterloo field

General Characteristics

Specific gravity: 0.875
Sulfur, per cent: 0.79
Saybolt Universal Viscosity (100°F): 81.0

A.P.I. Gravity: 30.2°
Color: Brown

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure — Barometer Reading 749.2 First drop, 136°F

Fraction No.	Cut at °C	Cut at °F	Per cent cut	Sum per cent	Sp. gr. 60/60°F	°A.P.I. 60°F	S.U. visc. 100°F	Cloud Test °F	C.I.[1]	K[2]
1	50	122								
2	75	167	1.6	1.6	0.691	73.3	—	—	17	12.16
3	100	212	1.0	2.6	0.709	68.1	—	—	16	12.19
4	125	257	2.6	5.2	0.719	65.3	—	—	12	12.27
5	150	302	2.7	7.9	0.738	60.2	—	—	13	12.18
6	175	347	3.6	11.5	0.755	55.9	—	—	14	12.17
7	200	392	4.4	15.9	0.770	52.3	—	—	15	12.19
8	225	437	4.4	20.3	0.783	49.2	—	—	16	12.15
9	250	482	5.4	25.7	0.800	45.4	—	—	19	12.10
10	275	527	8.4	34.1	0.813	42.6	—	—	20	12.13
Vacuum distillation at 40 mm.										
11	200	392	6.7	40.8	0.823	40.4	38	20	21	12.34
12	225	437	6.3	47.1	0.835	38.0	43	35	23	12.28
13	250	482	5.2	52.3	0.848	35.4	53	55	26	12.28
14	275	527	5.4	57.7	0.877	29.8	80	75	40	11.79
15	300	572	6.5	64.2	0.892	27.1	140	95	44	11.72

Carbon residue of residuum, 11.5% — Carbon residue of crude, 4.6%

APPROXIMATE SUMMARY

	Per cent	Sp. gr.	°A.P.I.	Viscosity
Light gasoline	2.6	0.698	71.2	
Gasoline and naphtha	15.9	0.741	59.5	
Kerosene	18.2	0.802	44.9	
Gas oil	13.9	0.830	39.0	below 50
Non-viscous lub. dist.	9.0	0.844-0.882	36.2-28.9	50-100
Medium lub. dist.	7.2	0.882-0.900	28.9-25.7	100-200
Viscous lub. dist.	0.0			
Residuum	35.8	0.968	14.7	
Distillation loss	0.0			

[1]Correlation Index
[2]Characterization Factor

Lab. No. O-232

Oil from: McClosky "lime"
Iowa (Lower Miss.) series
Depth 2915 feet

Richland County
Sec. 36, T. 5 N., R. 9 E.
Dundas field

General Characteristics

Specific gravity: 0.833
Sulfur, per cent: 0.17
Saybolt Universal Viscosity (100°F): 40.0

A.P.I. Gravity: 38.4°
Color: Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure — Barometer Reading 746.4 First drop, 86°F

Fraction No.	Cut at °C	Cut at °F	Per cent cut	Sum per cent	Sp. gr. 60/60°F	°A.P.I. 60°F	S.U. visc. 100°F	Cloud Test °F	C.I.[1]	K[2]
1	50	122	3.3	3.3	0.644	88.2	—	—		
2	75	167	3.3	6.6	0.677	77.5	—	—	11	12.43
3	100	212	5.4	12.0	0.715	66.4	—	—	19	12.10
4	125	257	6.9	18.9	0.740	59.7	—	—	22	11.91
5	150	302	5.3	24.2	0.760	54.7	—	—	24	11.84
6	175	347	5.9	30.1	0.773	51.6	—	—	23	11.90
7	200	392	4.9	35.0	0.790	47.6	—	—	25	11.87
8	225	437	5.0	40.0	0.805	44.3	—	—	26	11.80
9	250	482	5.1	45.1	0.818	41.5	—	—	27	11.83
10	275	527	5.8	50.9	0.833	38.4	—	—	30	11.81
Vacuum distillation at 40 mm.										
11	200	392	4.8	55.7	0.843	36.4	39	5	30	11.84
12	225	437	4.9	60.6	0.855	34.0	46	30	32	11.84
13	250	482	4.8	65.4	0.868	31.5	62	55	35	11.82
14	275	527	4.2	69.6	0.878	29.7	90	75	40	11.79
15	300	572	5.6	75.2	0.887	28.0	160	95	42	11.80

Carbon residue of residuum, 6.8% — Carbon residue of crude, 1.8%

APPROXIMATE SUMMARY

	Per cent	Sp. gr.	°A.P.I.	Viscosity
Light gasoline	12.0	0.685	75.1	
Gasoline and naphtha	35.0	0.737	60.5	
Kerosene	10.1	0.812	42.8	
Gas oil	14.3	0.842	36.6	below 50
Non-viscous lub. dist.	8.8	0.858-0.879	33.4-29.5	50-100
Medium lub. dist.	6.9	0.879-0.892	29.5-27.1	100-200
Viscous lub. dist.	0.1	0.892-0.892	27.1-27.1	above 200
Residuum	22.8	0.946	18.1	
Distillation loss	2.0			

[1]Correlation Index
[2]Characterization Factor

Lab. No. O-233

Oil from: Bethel formation
Chester (Upper Miss.) series
Depth 1329 feet

Clinton County
Sec. 2, T. 1 N., R. 2 W.
Hoffman field

General Characteristics

Specific gravity: 0.859
Sulfur, per cent: 0.21
Saybolt Universal Viscosity (100°F): 49.0

A.P.I. Gravity: 33.2°
Color: Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure — Barometer Reading 750.2 First drop, 119°F

Fraction No.	Cut at °C	°F	Per cent cut	Sum per cent	Sp. gr. 60/60°F	°A.P.I. 60°F	S.U. visc. 100°F	Cloud Test °F	C.I.[1]	K[2]
1	50	122								
2	75	167	2.0	2.0	0.685	75.1	—	—	15	12.26
3	100	212	2.0	4.0	0.710	67.8	—	—	17	12.17
4	125	257	5.9	9.9	0.729	62.6	—	—	17	12.10
5	150	302	6.3	16.2	0.749	57.4	—	—	18	12.02
6	175	347	5.7	21.9	0.765	53.5	—	—	19	12.01
7	200	392	5.7	27.6	0.783	49.2	—	—	22	11.96
8	225	437	6.0	33.6	0.798	45.8	—	—	23	11.92
9	250	482	5.7	39.3	0.813	42.6	—	—	25	11.90
10	275	527	7.2	46.5	0.830	39.0	—	—	28	11.84
Vacuum distillation at 40 mm.										
11	200	392	4.2	50.7	0.843	36.4	41	10	30	11.84
12	225	437	6.1	56.8	0.853	34.4	45	35	31	11.87
13	250	482	6.0	62.8	0.865	32.1	59	60	34	11.86
14	275	527	5.3	68.1	0.876	30.0	85	75	38	11.83
15	300	572	6.4	74.5	0.887	28.0	150	95	42	11.80

Carbon residue of residuum, 9.7% — Carbon residue of crude, 2.8%

APPROXIMATE SUMMARY

	Per cent	Sp. gr.	°A.P.I.	Viscosity
Light gasoline	4.0	0.698	71.2	
Gasoline and naphtha	27.6	0.748	57.7	
Kerosene	11.7	0.805	44.3	
Gas oil	16.6	0.840	37.0	below 50
Non-viscous lub. dist.	10.9	0.857-0.878	33.6-29.7	50-100
Medium lub. dist.	7.7	0.878-0.893	29.7-27.0	100-200
Viscous lub. dist.	0.0			
Residuum	25.0	0.967	14.8	
Distillation loss	0.5			

[1]Correlation Index
[2]Characterization Factor

Lab. No. O-234

Oil from: McClosky "lime"
Iowa (Lower Miss.) series
Depth 2026 feet

Coles County
Sec. 35, T. 12 N., R. 7 E.
Mattoon field

General Characteristics

Specific gravity: 0.842
Sulfur, per cent: 0.29
Saybolt Universal Viscosity (100°F): 41.0

A.P.I. Gravity: 36.6°
Color: Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure — Barometer Reading 749.4 First drop, 89°F

Fraction No.	Cut at °C	Cut at °F	Per cent cut	Sum per cent	Sp. gr. 60/60°F	°A.P.I. 60°F	S.U. visc. 100°F	Cloud Test °F	C.I.[1]	K[2]
1	50	122	3.1	3.1	0.642	88.9	—	—		
2	75	167	2.7	5.8	0.677	77.5	—	—	11	12.43
3	100	212	5.2	11.0	0.725	63.7	—	—	24	11.91
4	125	257	6.5	17.5	0.743	59.0	—	—	23	11.86
5	150	302	5.9	23.4	0.758	55.2	—	—	23	11.87
6	175	347	4.8	28.2	0.773	51.6	—	—	23	11.90
7	200	392	4.4	32.6	0.788	48.1	—	—	24	11.90
8	225	437	5.3	37.9	0.803	44.7	—	—	25	11.83
9	250	482	5.3	43.2	0.818	41.5	—	—	27	11.83
10	275	527	6.9	50.1	0.833	38.4	—	—	30	11.81
Vacuum distillation at 40 mm.										
11	200	392	4.1	54.2	0.843	36.4	41	10	30	11.84
12	225	437	4.5	58.7	0.853	34.4	45	35	31	11.87
13	250	482	4.9	63.6	0.865	32.1	57	55	34	11.86
14	275	527	5.1	68.7	0.877	29.8	85	80	40	11.79
15	300	572	6.0	74.7	0.892	27.1	150	95	44	11.72

Carbon residue of residuum, 7.7% — Carbon residue of crude, 2.2%

APPROXIMATE SUMMARY

	Per cent	Sp. gr.	°A.P.I.	Viscosity
Light gasoline	11.0	0.690	73.6	
Gasoline and naphtha	32.6	0.738	60.2	
Kerosene	10.6	0.811	43.0	
Gas oil	15.2	0.841	36.8	below 50
Non-viscous lub. dist.	9.2	0.858-0.881	33.4-29.1	50-100
Medium lub. dist.	7.1	0.881-0.900	29.1-25.7	100-200
Viscous lub. dist.	0.0			
Residuum	24.5	0.955	16.7	
Distillation loss	0.8			

[1]Correlation Index
[2]Characterization Factor

Lab. No. O-235

Oil from: McClosky "lime"
Iowa (Lower Miss.) series
Depth 3485 feet

Wayne County
Sec. 8, T. 3 S., R. 9 E.
Leech Township field

General Characteristics

Specific gravity: 0.830
Sulfur, per cent: 0.19
Saybolt Universal Viscosity (100°F): 43.0

A.P.I. Gravity: 39.0°
Color: Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure — Barometer Reading 744.3 First drop, 92°F

Fraction No.	Cut at °C	Cut at °F	Per cent cut	Sum per cent	Sp. gr. 60/60°F	°A.P.I. 60°F	S.U. visc. 100°F	Cloud Test °F	C.I.[1]	K[2]
1	50	122	3.3	3.3	0.637	90.6	—	—		
2	75	167	4.1	7.4	0.683	75.7	—	—	14	12.30
3	100	212	4.0	11.4	0.719	65.3	—	—	21	12.02
4	125	257	4.4	15.8	0.743	59.0	—	—	23	11.86
5	150	302	5.7	21.5	0.758	55.2	—	—	23	11.87
6	175	347	5.7	27.2	0.773	51.6	—	—	23	11.90
7	200	392	4.8	32.0	0.789	47.8	—	—	24	11.88
8	225	437	5.4	37.4	0.807	43.8	—	—	27	11.77
9	250	482	4.7	42.1	0.823	40.4	—	—	30	11.77
10	275	527	6.4	48.5	0.837	37.6	—	—	32	11.75
Vacuum distillation at 40 mm.										
11	200	392	1.8	50.3	0.850	35.0	40	10	34	11.75
12	225	437	4.2	54.5	0.860	33.0	47	30	35	11.77
13	250	482	5.2	59.7	0.872	30.8	60	45	37	11.76
14	275	527	4.7	64.4	0.880	29.3	85	65	38	11.84
15	300	572	5.5	69.9	0.891	27.3	160	80	40	11.85

Carbon residue of residuum, 4.1% — Carbon residue of crude, 1.3%

APPROXIMATE SUMMARY

	Per cent	Sp. gr.	°A.P.I.	Viscosity
Light gasoline	11.4	0.682	76.0	
Gasoline and naphtha	32.0	0.736	60.8	
Kerosene	10.1	0.814	42.3	
Gas oil	11.6	0.845	36.0	below 50
Non-viscous lub. dist.	9.4	0.863-0.882	32.5-28.9	50-100
Medium lub. dist.	6.8	0.882-0.897	28.9-26.3	100-200
Viscous lub. dist.	0.0			
Residuum	27.7	0.927	21.2	
Distillation loss	2.4			

[1] Correlation Index
[2] Characterization Factor

Lab. No. O-236

Oil from: McClosky "lime"
Iowa (Lower Miss.) series
Depth 3411 feet

Wayne County
Sec. 26, T. 2 S., R. 8 E.
Barnhill field

General Characteristics

Specific gravity: 0.837
Sulfur, per cent: 0.17
Saybolt Universal Viscosity (100°F): 44.0

A.P.I. Gravity: 37.6°
Color: Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure — Barometer Reading 747.6 First drop, 89°F

Fraction No.	Cut at °C	Cut at °F	Per cent cut	Sum per cent	Sp. gr. 60/60°F	°A.P.I. 60°F	S.U. visc. 100°F	Cloud Test °F	C.I.[1]	K[2]
1	50	122	2.0	2.0	0.643	88.6	—	—		
2	75	167	2.5	4.5	0.678	77.2	—	—	11	12.40
3	100	212	4.5	9.0	0.719	65.3	—	—	21	12.02
4	125	257	6.3	15.3	0.745	58.4	—	—	24	11.84
5	150	302	5.1	20.4	0.765	53.5	—	—	26	11.77
6	175	347	5.5	25.9	0.785	48.8	—	—	29	11.71
7	200	392	5.0	30.9	0.798	45.8	—	—	29	11.74
8	225	437	5.2	36.1	0.813	42.6	—	—	30	11.68
9	250	482	5.1	41.2	0.825	40.0	—	—	31	11.74
10	275	527	6.5	47.7	0.840	37.0	—	—	33	11.71
Vacuum distillation at 40 mm.										
11	200	392	3.4	51.1	0.849	35.2	39	5	33	11.77
12	225	437	5.3	56.4	0.860	33.0	46	25	35	11.77
13	250	482	5.4	61.8	0.870	31.1	62	50	36	11.79
14	275	527	4.6	66.4	0.876	30.0	95	70	40	11.80
15	300	572	5.8	72.2	0.885	28.4	160	85	41	11.81

Carbon residue of residuum, 4.4% — Carbon residue of crude, 1.3%

APPROXIMATE SUMMARY

	Per cent	Sp. gr.	°A.P.I.	Viscosity
Light gasoline	9.0	0.691	73.3	
Gasoline and naphtha	30.9	0.748	57.7	
Kerosene	10.3	0.819	41.3	
Gas oil	13.9	0.847	35.6	below 50
Non-viscous lub. dist.	9.4	0.862-0.877	32.7-29.8	50-100
Medium lub. dist.	7.7	0.877-0.890	29.8-27.5	100-200
Viscous lub. dist.	0.0			
Residuum	25.9	0.935	19.8	
Distillation loss	1.9			

[1]Correlation Index
[2]Characterization Factor

Lab. No. O-237

Oil from: McClosky "lime"
Iowa (Lower Miss.) series
Depth 3149 feet

White County
Sec. 12, T. 6 S., R. 8 E
Stokes field

General Characteristics

Specific gravity: 0.846
Sulfur, per cent: 0.26
Saybolt Universal Viscosity (100°F): 43.0

A.P.I. Gravity: 35.8°
Color: Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure — Barometer Reading 742.7 First drop, 95°F

Fraction No.	Cut at °C	Cut at °F	Per cent cut	Sum per cent	Sp. gr. 60/60°F	°A.P.I. 60°F	S.U. visc. 100°F	Cloud Test °F	C.I.[1]	K[2]
1	50	122	1.8	1.8	0.640	89.6	—	—		
2	75	167	2.6	4.4	0.670	79.7	—	—	7.5	12.60
3	100	212	5.1	9.5	0.710	67.8	—	—	17	12.17
4	125	257	6.3	15.8	0.738	60.2	—	—	21	11.94
5	150	302	5.7	21.5	0.760	54.7	—	—	24	11.84
6	175	347	4.9	26.4	0.777	50.6	—	—	25	11.83
7	200	392	5.0	31.4	0.792	47.2	—	—	26	11.84
8	225	437	5.2	36.6	0.808	43.6	—	—	28	11.75
9	250	482	4.9	41.5	0.820	41.1	—	--	28	11.81
10	275	527	6.1	47.6	0.833	38.4	—	—	30	11.81
Vacuum distillation at 40 mm.										
11	200	392	4.0	51.6	0.845	36.0	40	5	31	11.82
12	225	437	4.7	56.3	0.855	34.0	47	30	32	11.84
13	250	482	5.2	61.5	0.870	31.2	60	50	36	11.79
14	275	527	5.0	66.5	0.881	29.1	90	70	42	11.71
15	300	572	6.0	72.5	0.890	27.5	150	90	43	11.76

Carbon residue of residuum, 5.4% — Carbon residue of crude, 1.6%

APPROXIMATE SUMMARY

	Per cent	Sp. gr.	°A.P.I.	Viscosity
Light gasoline	9.5	0.686	74.8	
Gasoline and naphtha	31.4	0.741	59.5	
Kerosene	10.1	0.814	42.3	
Gas oil	13.7	0.842	36.6	below 50
Non-viscous lub. dist.	9.7	0.859-0.883	33.2-28.8	50-100
Medium lub. dist.	7.6	0.883-0.895	28.8-26.6	100-200
Viscous lub. dist.	0.0			
Residuum	26.4	0.938	19.4	
Distillation loss	1.1			

[1]Correlation Index
[2]Characterization Factor

Lab. No. O-238

Oil from: Bethel formation
Chester (Upper Miss.) series
Depth 2079 feet

Jefferson County
Sec. 9, T. 1 S., R. 1 E
Cravat field

General Characteristics

Specific gravity: 0.848
Sulfur, per cent: 0.23
Saybolt Universal Viscosity (100°F): 43.0

A.P.I. Gravity: 35.4°
Color: Brown

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure — Barometer Reading 746.2 First drop, 98°F

Fraction No.	Cut at °C	Cut at °F	Per cent cut	Sum per cent	Sp. gr. 60/60°F	°A.P.I. 60°F	S.U. visc. 100°F	Cloud Test °F	C.I.[1]	K[2]
1	50	122	2.4	2.4	0.643	88.6	—	—		
2	75	167	3.3	5.7	0.683	75.7	—	—	14	12.30
3	100	212	5.1	10.8	0.717	65.9	—	—	20	12.06
4	125	257	5.8	16.6	0.743	59.0	—	—	23	11.86
5	150	302	5.1	21.7	0.762	54.2	—	—	25	11.81
6	175	347	5.0	26.7	0.775	51.1	—	—	24	11.87
7	200	392	5.0	31.7	0.790	47.6	—	—	25	11.87
8	225	437	5.1	36.8	0.805	44.3	—	—	26	11.80
9	250	482	5.3	42.1	0.820	41.1	—	—	28	11.81
10	275	527	7.3	49.4	0.838	37.4	—	—	32	11.74
Vacuum distillation at 40 mm.										
11	200	392	3.8	53.2	0.848	35.4	39	10	33	11.78
12	225	437	4.7	57.9	0.863	32.5	46	30	36	11.73
13	250	482	6.2	64.1	0.873	30.6	62	60	37	11.75
14	275	527	5.5	69.6	0.883	28.8	100	80	39	11.81
15	300	572	6.6	76.2	0.893	27.0	200	95	41	11.82

Carbon residue of residuum, 8.7% — Carbon residue of crude, 2.4%

APPROXIMATE SUMMARY

	Per cent	Sp. gr.	°A.P.I.	Viscosity
Light gasoline	10.8	0.690	73.6	
Gasoline and naphtha	31.7	0.741	59.5	
Kerosene	10.4	0.813	42.6	
Gas oil	14.8	0.846	35.8	below 50
Non-viscous lub. dist.	10.0	0.866-0.883	31.9-28.8	50-100
Medium lub. dist.	6.0	0.883-0.893	28.8-27.0	100-200
Viscous lub. dist.	3.3	0.893-0.899	27.0-25.9	above 200
Residuum	21.7	0.954	16.8	
Distillation loss	2.1			

[1]Correlation Index
[2]Characterization Factor

Lab. No. O-239

Oil from: "Trenton" limestone
Ordovician system
Depth 4068 feet

Clinton County
Sec. 12, T. 1 N., R. 1 W.
Centralia field

General Characteristics

Specific gravity: 0.810
Sulfur, per cent: 0.28
Saybolt Universal Viscosity (100°F): 39.0

A.P.I. Gravity: 43.2°
Color: Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure — Barometer Reading 748.2 First drop, 94°F

Fraction No.	Cut at °C	Cut at °F	Per cent cut	Sum per cent	Sp. gr. 60/60°F	°A.P.I. 60°F	S.U. visc. 100°F	Cloud Test °F	C.I.[1]	K[2]
1	50	122	4.4	4.4	0.651	85.9	—	—		
2	75	167	4.4	8.8	0.681	76.3	—	—	13	12.34
3	100	212	4.6	13.4	0.718	65.6	—	—	20	12.04
4	125	257	5.1	18.5	0.730	62.3	—	—	17	12.08
5	150	302	5.1	23.6	0.748	57.7	—	—	18	12.03
6	175	347	5.4	29.0	0.759	54.9	—	—	16	12.10
7	200	392	5.3	34.3	0.768	52.8	—	—	14	12.22
8	225	437	5.3	39.6	0.788	48.1	—	—	18	12.07
9	250	482	5.6	45.2	0.800	45.4	—	—	19	12.10
10	275	527	7.0	52.2	0.813	42.6	—	—	20	12.13
Vacuum distillation at 40 mm.										
11	200	392	3.7	55.9	0.828	39.4	38	15	23	12.08
12	225	437	5.1	61.0	0.843	36.4	42	30	27	12.02
13	250	482	5.0	66.0	0.855	34.0	53	50	29	12.00
14	275	527	4.6	70.6	0.871	31.0	75	80	37	11.86
15	300	572	4.9	75.5	0.885	28.4	120	95	41	11.82

Carbon residue of residuum, 6.0% — Carbon residue of crude, 1.5%

APPROXIMATE SUMMARY

	Per cent	Sp. gr.	°A.P.I.	Viscosity
Light gasoline	13.4	0.684	75.4	
Gasoline and naphtha	34.3	0.725	63.7	
Kerosene	17.9	0.802	44.9	
Gas oil	10.0	0.838	37.4	below 50
Non-viscous lub. dist.	8.8	0.852-0.879	34.6-29.5	50-100
Medium lub. dist.	4.5	0.879-0.892	29.5-27.1	100-200
Viscous lub. dist.	0.0			
Residuum	20.7	0.937	19.5	
Distillation loss	3.8			

[1]Correlation Index
[2]Characterization Factor

Lab. No. O-240

Oil from: Bethel formation
Chester (Upper Miss.) series
Depth 1964 feet

Jefferson County
Sec. 10, T. 1 S., R. 2 E.
Dix field

General Characteristics

Specific gravity: 0.835
Sulfur, per cent: 0.18
Saybolt Universal Viscosity (100°F): 40.0

A.P.I. Gravity: 38.0°
Color: Brown

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure — Barometer Reading 750.1 First drop, 93°F

Fraction No.	Cut at °C	Cut at °F	Per cent cut	Sum per cent	Sp. gr. 60/60°F	°A.P.I. 60°F	S.U. visc. 100°F	Cloud Test °F	C.I.[1]	K[2]
1	50	122	3.9	3.9	0.647	87.2	—	—		
2	75	167	3.6	7.5	0.686	74.8	—	—	15	12.25
3	100	212	5.4	12.9	0.735	61.0	—	—	28	11.74
4	125	257	6.1	19.0	0.750	57.2	—	—	27	11.77
5	150	302	4.9	23.9	0.765	53.5	—	—	26	11.77
6	175	347	5.4	29.3	0.780	49.9	—	—	26	11.79
7	200	392	4.7	34.0	0.795	46.5	—	—	27	11.79
8	225	437	4.6	38.6	0.813	42.6	—	—	30	11.68
9	250	482	4.9	43.5	0.828	39.4	—	—	32	11.71
10	275	527	7.1	50.6	0.838	37.4	—	—	32	11.74
Vacuum distillation at 40 mm.										
11	200	392	3.1	53.7	0.847	35.6	39	10	32	11.80
12	225	437	4.7	58.4	0.857	33.6	45	35	34	11.80
13	250	482	5.1	63.5	0.867	31.7	56	55	35	11.83
14	275	527	5.3	68.8	0.878	29.7	85	75	37	11.86
15	300	572	6.3	75.1	0.888	27.9	150	95	38	11.88

Carbon residue of residuum, 10.1% — Carbon residue of crude, 2.6%

APPROXIMATE SUMMARY

	Per cent	Sp. gr.	°A.P.I.	Viscosity
Light gasoline	12.9	0.695	72.1	
Gasoline and naphtha	34.0	0.742	59.2	
Kerosene	4.6	0.813	42.6	
Gas oil	19.7	0.841	36.8	below 50
Non-viscous lub. dist.	9.3	0.862-0.880	32.7-29.3	50-100
Medium lub. dist.	7.5	0.880-0.894	29.3-26.8	100-200
Viscous lub. dist.	0.0			
Residuum	22.2	0.963	15.4	
Distillation loss	2.7			

[1]Correlation Index
[2]Characterization Factor

Lab. No. O-241

Oil from: St. Louis limestone
Iowa (Lower Miss.) series
Depth 3061 feet

Jefferson County
Sec. 25, T. 4 S., R. 2 E.
Ina field

General Characteristics

Specific gravity: 0.843
Sulfur, per cent: 0.20
Saybolt Universal Viscosity (100°F): 42.0

A.P.I. Gravity: 36.4°
Color: Green

DISTILLATION BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure — Barometer Reading 748.6 First drop, 91°F

Fraction No.	Cut at °C	Cut at °F	Per cent cut	Sum per cent	Sp. gr. 60/60°F	°A.P.I. 60°F	S.U. visc. 100°F	Cloud Test °F	C.I.[1]	K[2]
1	50	122	1.9	1.9	0.638	90.3	—	—		
2	75	167	2.8	4.7	0.668	80.3	—	—	6.5	12.65
3	100	212	4.8	9.5	0 714	66.7	—	—	18	12.11
4	125	257	6.6	16.1	0.743	59.0	—	—	23	11.86
5	150	302	5.8	21.9	0.758	55.2	—	—	23	11.87
6	175	347	6.0	27.9	0.773	51.6	—	—	23	11.90
7	200	392	5.3	33.2	0.788	48.1	—	—	24	11.90
8	225	437	5.2	38.4	0.800	45.4	—	—	24	11.89
9	250	482	5.5	43.9	0.818	41.5	—	—	27	11.83
10	275	527	5.8	49.7	0.833	38.4	—	—	30	11.81
Vacuum distillation at 40 mm.										
11	200	392	3.7	53.4	0.845	36.0	39	5	31	11.82
12	225	437	5.1	58.5	0.858	33.4	45	30	34	11.80
13	250	482	5.3	63.8	0.870	31.1	59	50	36	11.79
14	275	527	5.0	68.8	0.881	29.1	85	65	41	11.73
15	300	572	6.2	75.0	0.892	27.1	150	85	45	11.71

Carbon residue of residuum, 7.7% — Carbon residue of crude, 2.1%

APPROXIMATE SUMMARY

	Per cent	Sp. gr.	°A.P.I.	Viscosity
Light gasoline	9.5	0.685	75.1	
Gasoline and naphtha	33.2	0.742	59.2	
Kerosene	10.7	0.809	43.4	
Gas oil	13.9	0.843	36.4	below 50
Non-viscous lub. dist.	9.8	0.862-0.884	32.7-28.6	50-100
Medium lub. dist.	7.4	0.884-0.898	28.6-26.1	100-200
Viscous lub. dist.	0.0			
Residuum	23.4	0.951	17.3	
Distillation loss	1.6			

[1]Correlation Index
[2]Characterization Factor

Lab. No. O-242

Oil from: McClosky "lime"
Iowa (Lower Miss.) series
Depth 2258 feet

Jefferson County
Sec. 22, T. 2 S., R. 1 E.
Roaches field

General Characteristics

Specific gravity: 0.840
Sulfur, per cent: 0.22
Saybolt Universal Viscosity (100°F): 41.0

A.P.I. Gravity: 37.0°
Color: Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure — Barometer Reading 746.9 First drop, 91°F

Fraction No.	Cut at °C	Cut at °F	Per cent cut	Sum per cent	Sp. gr. 60/60°F	°A.P.I. 60°F	S.U. visc. 100°F	Cloud Test °F	C.I.[1]	K[2]
1	50	122	2.9	2.9	0.639	89.9	—	—		
2	75	167	3.3	6.2	0.672	79.1	—	—	8.4	12.56
3	100	212	4.7	10.9	0.718	65.6	—	—	20	12.04
4	125	257	6.3	17.2	0.740	59.7	—	—	22	11.91
5	150	302	5.3	22.5	0.759	54.9	—	—	23	11.85
6	175	347	5.2	27.7	0.773	51.6	—	—	23	11.90
7	200	392	4.8	32.5	0.788	48.1	—	—	24	11.90
8	225	437	4.7	37.2	0.803	44.7	—	—	25	11.83
9	250	482	5.0	42.2	0.818	41.5	—	—	27	11.83
10	275	527	5.9	48.1	0.833	38.4	—	—	30	11.81
Vacuum distillation at 40 mm.										
11	200	392	4.3	52.4	0.848	35.4	39	5	33	11.78
12	225	437	5.1	57.5	0.858	33.4	45	30	34	11.80
13	250	482	5.2	62.7	0.872	30.8	57	45	37	11.76
14	275	527	4.9	67.6	0.878	29.7	85	65	40	11.77
15	300	572	6.0	73.6	0.890	27.5	150	85	43	11.76

Carbon residue of residuum, 9.4% — Carbon residue of crude, 2.6%

APPROXIMATE SUMMARY

	Per cent	Sp. gr.	°A.P.I.	Viscosity
Light gasoline	10.9	0.683	75.7	
Gasoline and naphtha	32.5	0.736	60.8	
Kerosene	9.7	0.811	43.0	
Gas oil	14.9	0.845	36.0	below 50
Non-viscous lub. dist.	9.3	0.864-0.881	32.3-29.1	50-100
Medium lub. dist.	7.2	0.881-0.897	29.1-26.3	100-200
Viscous lub. dist.	0.0			
Residuum	23.8	0.961	15.7	
Distillation loss	2.6			

[1]Correlation Index
[2]Characterization Factor

Lab. No. O-245

Oil from: McClosky "lime"
Iowa (Lower Miss.) series
Depth 2882 feet

Jasper County
Sec. 16, T. 6 N., R. 10 E.
N. Boos field

General Characteristics

Specific gravity: 0.832
Sulfur, per cent: 0.20
Saybolt Universal Viscosity (100°F): 39.8

A.P.I. Gravity: 38.6°
Color: Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure — Barometer Reading 747.9 First drop, 96°F

Fraction No.	Cut at °C	Cut at °F	Per cent cut	Sum per cent	Sp. gr. 60/60°F	°A.P.I. 60°F	S.U. visc. 100°F	Cloud Test °F	C.I.[1]	K[2]
1	50	122	2.7	2.7	0.642	88.9	—	—		
2	75	167	3.4	6.1	0.667	80.6	—	—	6.1	12.68
3	100	212	5.4	11.5	0.709	68.1	—	—	16	12.19
4	125	257	6.7	18.2	0.735	61.0	—	—	19	11.99
5	150	302	6.1	24.3	0.755	55.9	—	—	21	11.91
6	175	347	5.5	29.8	0.773	51.6	—	—	23	11.90
7	200	392	5.1	34.9	0.788	48.1	—	—	24	11.90
8	225	437	5.2	40.1	0.804	44.5	—	—	26	11.81
9	250	482	5.3	45.4	0.818	41.5	—	—	27	11.83
10	275	527	6.1	51.5	0.835	38.0	—	—	31	11.78
Vacuum distillation at 40 mm.										
11	200	392	4.3	55.8	0.848	35.4	39	10	33	11.78
12	225	437	4.6	60.4	0.858	33.4	45	30	34	11.80
13	250	482	4.7	65.1	0.868	31.5	56	50	35	11.82
14	275	527	4.9	70.0	0.878	29.7	85	75	40	11.77
15	300	572	5.6	75.6	0.890	27.5	150	90	43	11.76

Carbon residue of residuum, 8.8% — Carbon residue of crude, 2.3%

APPROXIMATE SUMMARY

	Per cent	Sp. gr.	°A.P.I.	Viscosity
Light gasoline	11.5	0.681	76.3	
Gasoline and naphtha	34.9	0.734	61.3	
Kerosene	10.5	0.811	42.9	
Gas oil	14.8	0.846	35.8	below 50
Non-viscous lub. dist.	8.6	0.863-0.881	32.5-29.1	50-100
Medium lub. dist.	6.8	0.881-0.897	29.1-26.3	100-200
Viscous lub. dist.	0.0			
Residuum	22.4	0.956	16.5	
Distillation loss	2.0			

[1]Correlation Index
[2]Characterization Factor

Lab. No. O-246

Oil from: Cypress formation
Chester (Upper Miss.) series
Depth 2640 feet

Edwards County
Sec. 34, T. 2 S., R. 14 W
Cowling field

General Characteristics

Specific gravity: 0.842
Sulfur, per cent: 0.23
Saybolt Universal Viscosity (100°F): 42.0

A.P.I. Gravity: 36.6°
Color: Brown

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure — Barometer Reading 747.8 First drop, 92°F

Fraction No.	Cut at °C	Cut at °F	Per cent cut	Sum per cent	Sp. gr. 60/60°F	°A.P.I. 60°F	S.U. visc. 100°F	Cloud Test °F	C.I.[1]	K[2]
1	50	122	2.6	2.6	0.646	87.5	—	—		
2	75	167	2.7	5.3	0.666	81.0	—	—	5.6	12.70
3	100	212	4.6	9.9	0.709	68.1	—	—	16	12.19
4	125	257	6.4	16.3	0.732	61.8	—	—	18	12.04
5	150	302	5.5	21.8	0.748	57.7	—	—	18	12.03
6	175	347	4.9	26.7	0.768	52.8	—	—	21	11.97
7	200	392	4.6	31.3	0.785	48.8	—	—	23	11.94
8	225	437	5.2	36.5	0.798	45.8	—	—	23	11.92
9	250	482	5.3	41.8	0.813	42.6	—	—	25	11.90
10	275	527	5.8	47.6	0.830	39.0	—	—	28	11.84
Vacuum distillation at 40 mm.										
11	200	392	4.9	52.5	0.843	36.4	38	5	30	11.84
12	225	437	5.3	57.8	0.853	34.4	44	30	31	11.87
13	250	482	5.1	62.9	0.865	32.1	57	60	34	11.86
14	275	527	4.7	67.6	0.873	30.6	80	75	39	11.82
15	300	572	5.8	73.4	0.882	28.9	150	85	40	11.83

Carbon residue of residuum, 10.5% — Carbon residue of crude, 3.1%

APPROXIMATE SUMMARY

	Per cent	Sp. gr.	°A.P.I.	Viscosity
Light gasoline	9.9	0.681	76.3	
Gasoline and naphtha	31.3	0.732	61.8	
Kerosene	10.5	0.806	44.1	
Gas oil	15.8	0.841	36.8	below 50
Non-viscous lub. dist.	9.2	0.858-0.876	33.4-30.0	50-100
Medium lub. dist.	6.6	0.876-0.887	30.0-28.0	100-200
Viscous lub. dist	0.0			
Residuum	24.9	0.965	15.1	
Distillation loss	1.7			

[1]Correlation Index
[2]Characterization Factor

Lab. No. O-247

Oil from: Bethel formation
Chester (Upper Miss.) series
Depth 2719 feet

White County
Sec. 9, T. 4 S., R. 14 W.
Calvin field

General Characteristics

Specific gravity: 0.845
Sulfur, per cent: 0.24
Saybolt Universal Viscosity (100°F): 41.0

A.P.I. Gravity: 36.0°
Color: Brown

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure — Barometer Reading 748.6 First drop, 101°F

Fraction No.	Cut at °C	Cut at °F	Per cent cut	Sum per cent	Sp. gr. 60/60°F	°A.P.I. 60°F	S.U. visc. 100°F	Cloud Test °F	C.I.[1]	K[2]
1	50	122	2.0	2.0	0.643	88.6	—	—		
2	75	167	5.1	7.1	0.678	77.2	—	—	11	12.40
3	100	212	5.0	12.1	0.725	63.7	—	—	24	11.91
4	125	257	6.4	18.5	0.745	58.4	—	—	24	11.84
5	150	302	5.3	23.8	0.760	54.7	—	—	24	11.84
6	175	347	5.2	29.0	0.773	51.6	—	—	23	11.90
7	200	392	4.6	33.6	0.788	48.1	—	—	24	11.90
8	225	437	5.3	38.9	0.803	44.7	—	—	25	11.83
9	250	482	5.2	44.1	0.818	41.5	—	—	27	11.83
10	275	527	5.7	49.8	0.830	39.0	—	—	28	11.84
Vacuum distillation at 40 mm.										
11	200	392	4.0	53.8	0.843	36.4	38	5	30	11.84
12	225	437	5.2	59.0	0.855	34.0	44	30	32	11.84
13	250	482	4.6	63.6	0.868	31.5	59	50	35	11.82
14	275	527	4.6	68.2	0.878	29.7	85	65	40	11.77
15	300	572	5.3	73.5	0.890	27.5	150	80	43	11.76

Carbon residue of residuum, 7.8% — Carbon residue of crude, 2.2%

APPROXIMATE SUMMARY

	Per cent	Sp. gr.	°A.P.I.	Viscosity
Light gasoline	12.1	0.692	73.0	
Gasoline and naphtha	33.6	0.738	60.2	
Kerosene	10.5	0.810	43.2	
Gas oil	14.3	0.841	36.8	below 50
Non-viscous lub. dist.	8.7	0.860-0.881	33.0-29.1	50-100
Medium lub. dist.	6.4	0.881-0.896	29.1-26.4	100-200
Viscous lub. dist.	0.0			
Residuum	24.6	0.976	13.5	
Distillation loss	1.9			

[1] Correlation Index
[2] Characterization Factor

Lab. No. O-248

Oil from: Tar Springs formation
Chester (Upper Miss.) series
Depth 2205 feet

White County
Sec. 9, T. 4 S., R. 14 W.
Calvin field

General Characteristics

Specific gravity: 0.845
Sulfur, per cent: 0.19
Saybolt Universal Viscosity (100°F): 41.0

A.P.I. Gravity: 36.0°
Color: Brown

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure — Barometer Reading 746.4 First drop, 91°F

Fraction No.	Cut at °C	Cut at °F	Per cent cut	Sum per cent	Sp. gr. 60/60°F	°A.P.I. 60°F	S.U. visc. 100°F	Cloud Test °F	C.I.[1]	K[2]
1	50	122	2.6	2.6	0.646	87.5	—	—		
2	75	167	3.3	5.9	0.681	76.3	—	—	13	12.34
3	100	212	5.2	11.1	0.725	63.7	—	—	24	11.91
4	125	257	5.9	17.0	0.747	57.9	—	—	25	11.81
5	150	302	5.5	22.5	0.758	55.2	—	—	23	11.87
6	175	347	4.8	27.3	0.773	51.6	—	—	23	11.90
7	200	392	4.9	32.2	0.788	48.1	—	—	24	11.90
8	225	437	4.9	37.1	0.800	45.4	—	—	24	11.89
9	250	482	5.3	42.4	0.813	42.6	—	—	25	11.90
10	275	527	6.0	48.4	0.828	39.4	—	—	27	11.87
Vacuum distillation at 40 mm.										
11	200	392	4.3	52.7	0.840	37.0	38	5	29	11.89
12	225	437	4.8	57.5	0.850	35.0	44	35	30	11.91
13	250	482	5.1	62.6	0.863	32.5	57	55	33	11.88
14	275	527	5.4	68.0	0.878	29.7	80	75	40	11.77
15	300	572	5.4	73.4	0.892	27.1	150	90	45	11.71

Carbon residue of residuum, 8.9% — Carbon residue of crude, 2.5%

APPROXIMATE SUMMARY

	Per cent	Sp. gr.	°A.P.I.	Viscosity
Light gasoline	11.1	0.693	72.7	
Gasoline and naphtha	32.2	0.741	59.5	
Kerosene	10.2	0.807	43.8	
Gas oil	15.0	0.838	37.4	below 50
Non-viscous lub. dist.	9.4	0.856-0.881	33.8-29.1	50-100
Medium lub. dist.	6.6	0.881-0.900	29.1-25.7	100-200
Viscous lub. dist.	0.0			
Residuum	23.7	0.970	14.4	
Distillation loss	2.9			

[1]Correlation Index
[2]Characterization Factor

Lab. No. O-250

Oil from: McClosky "lime"
Iowa (Lower Miss.) series
Depth 2906 feet

White County
Sec. 27, T. 4 S., R. 14 W.
New Harmony field

General Characteristics

Specific gravity: 0.829
Sulfur, per cent: 0.20
Saybolt Universal Viscosity (100°F): 38.5

A.P.I. Gravity: 39.2°
Color: Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure — Barometer Reading 749.3 First drop, 88°F

Fraction No.	Cut at °C	Cut at °F	Per cent cut	Sum per cent	Sp. gr. 60/60°F	°A.P.I. 60°F	S.U. visc. 100°F	Cloud Test °F	C.I.[1]	K[2]
1	50	122	3.5	3.5	0.639	89.9	—	—		
2	75	167	3.9	7.4	0.667	80.6	—	—	6.1	12.68
3	100	212	5.2	12 6	0.720	65.0	—	—	21	12.00
4	125	257	6.8	19.4	0.740	59.7	—	—	22	11.91
5	150	302	5.4	24.8	0.754	56.2	—	—	21	11.93
6	175	347	5.0	29.8	0.768	52.8	—	—	21	11.97
7	200	392	4.8	34.6	0.785	48.8	—	—	23	11.94
8	225	437	5.1	39.7	0.800	45.4	—	—	24	11.89
9	250	482	4.9	44.6	0.814	42.3	—	—	25	11.88
10	275	527	6.1	50.7	0.830	39.0	—	—	28	11.84
Vacuum distillation at 40 mm.										
11	200	392	4.4	55.1	0.845	36.0	39	5	31	11.82
12	225	437	4.6	59.7	0.858	33.4	45	30	34	11.80
13	250	482	5.3	65.0	0.868	31.5	61	50	35	11.82
14	275	527	5.0	70.0	0.878	29.7	90	70	40	11.77
15	300	572	5.6	75.6	0.887	28.0	160	95	42	11.79

Carbon residue of residuum, 7.6% — Carbon residue of crude, 1.9%

APPROXIMATE SUMMARY

	Per cent	Sp. gr.	°A.P.I.	Viscosity
Light gasoline	12.6	0.681	76.3	
Gasoline and naphtha	34.6	0.731	62.1	
Kerosene	10.0	0.807	43.8	
Gas oil	14.3	0.842	36.6	below 50
Non-viscous lub. dist.	9.3	0.861-0.879	32.8-29.5	50-100
Medium lub. dist.	7.4	0.879-0.892	29.5-27.1	100-200
Viscous lub. dist.	0.0			
Residuum	21.1	0.962	15.6	
Distillation loss	3.3			

[1]Correlation Index
[2]Characterization Factor

Lab. No. O-251

Oil from: McClosky-Rosiclare
Iowa (Lower Miss.) series
Depth 2655 feet

Wabash County
Sec. 26, T. 1 S., R. 13 W.
Maud field

General Characteristics

Specific gravity: 0.835
Sulfur, per cent: 0.30
Saybolt Universal Viscosity (100°F): 41.0

A.P.I. Gravity: 38.0°
Color: Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure — Barometer Reading 747.8 First drop, 88°F

Fraction No.	Cut at °C	Cut at °F	Per cent cut	Sum per cent	Sp. gr. 60/60°F	°A.P.I. 60°F	S.U. visc. 100°F	Cloud Test °F	C.I.[1]	K[2]
1	50	122	3.7	3.7	0.646	87.5	—	—		
2	75	167	3.9	7.6	0.673	78.8	—	—	8.9	12.53
3	100	212	5.4	13.0	0.728	62.9	—	—	25	11.86
4	125	257	5.9	18.9	0.745	58.4	—	—	24	11.84
5	150	302	5.2	24.1	0.757	55.4	—	—	22	11.88
6	175	347	4.4	28.5	0.773	51.6	—	—	23	11.90
7	200	392	4.0	32.5	0.788	48.1	—	—	24	11.90
8	225	437	4.6	37.1	0.803	44.7	—	—	25	11.83
9	250	482	5.0	42.1	0.818	41.5	—	—	27	11.83
10	275	527	6.1	48.2	0.830	39.0	—	—	28	11.84
Vacuum distillation at 40 mm.										
11	200	392	4.6	52.8	0.843	36.4	39	5	30	11.84
12	225	437	4.6	57.4	0.855	34.0	46	30	32	11.84
13	250	482	5.0	62.4	0.870	31.1	61	45	36	11.79
14	275	527	4.6	67.0	0.883	28.8	90	65	39	11.81
15	300	572	5.4	72.4	0.893	27.0	160	80	41	11.82

Carbon residue of residuum, 6.2% — Carbon residue of crude, 1.8%

APPROXIMATE SUMMARY

	Per cent	Sp. gr.	°A.P.I.	Viscosity
Light gasoline	13.0	0.688	74.2	
Gasoline and naphtha	32.5	0.733	61.6	
Kerosene	9.6	0.811	42.9	
Gas oil	14.3	0.840	37.0	below 50
Non-viscous lub. dist.	9.0	0.859-0.885	33.2-28.4	50-100
Medium lub. dist.	7.0	0.885-0.898	28.4-26.1	100-200
Viscous lub. dist.	0.0			
Residuum	24.6	0.949	17.6	
Distillation loss	3.0			

[1]Correlation Index
[2]Characterization Factor

Lab. No. O-252

Oil from: McClosky "lime"
Iowa (Lower Miss.) series
Depth 3113 feet

Franklin County
Sec. 35, T. 7 S., R. 4 E.
Thompsonville field

General Characteristics

Specific gravity: 0.836
Sulfur, per cent: 0.16
Saybolt Universal Viscosity (100°F): 43.0

A.P.I. Gravity: 37.8°
Color: Brown

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure — Barometer Reading 748.2 First drop, 94°F

Fraction No.	Cut at °C	Cut at °F	Per cent cut	Sum per cent	Sp. gr. 60/60°F	°A.P.I. 60°F	S.U. visc. 100°F	Cloud Test °F	C.I.[1]	K[2]
1	50	122	2.8	2.8	0.644	88.2	—	—		
2	75	167	3.0	5.8	0.668	80.3	—	—	6.5	12.65
3	100	212	4.8	10.6	0.709	68.1	—	—	16	12.19
4	125	257	6.1	16.7	0.733	61.6	—	—	18	12.02
5	150	302	5.0	21.7	0.748	57.7	—	—	18	12.03
6	175	347	4.7	26.4	0.763	54.0	—	—	18	12.05
7	200	392	4.8	31.2	0.775	51.1	—	—	18	12.10
8	225	437	5.1	36.2	0.790	47.6	—	—	19	12.04
9	250	482	4.9	41.2	0.805	44.3	—	—	21	12.01
10	275	527	5.9	47.1	0.820	41.1	—	—	23	11.98
Vacuum distillation at 40 mm.										
11	200	392	4.2	51.3	0.835	38.0	39	10	27	11.96
12	225	437	5.0	56.3	0.848	35.4	46	35	29	11.94
13	250	482	4.8	61.1	0.860	33.0	58	50	31	11.92
14	275	527	4.7	65.8	0.868	31.5	85	70	36	11.88
15	300	572	5.5	71.3	0.878	29.7	140	85	37	11.92

Carbon residue of residuum, 8.7% — Carbon residue of crude, 2.7%

APPROXIMATE SUMMARY

	Per cent	Sp. gr.	°A.P.I.	Viscosity
Light gasoline	10.6	0.680	76.6	
Gasoline and naphtha	31.2	0.728	62.9	
Kerosene	15.9	0.806	44.1	
Gas oil	8.3	0.840	37.0	below 50
Non-viscous lub. dist.	9.5	0.852-0.871	34.6-31.0	50-100
Medium lub. dist.	6.4	0.871-0.883	31.0-28.8	100-200
Viscous lub. dist.	0.0			
Residuum	26.1	0.958	16.2	
Distillation loss	2.6			

[1]Correlation Index
[2]Characterization Factor

Lab. No. O-253

Oil from: McClosky "lime"
Iowa (Lower Miss.) series
Depth 3496 feet

Wayne County
Sec. 4, T. 3 S., R. 8 E.
Barnhill field

General Characteristics

Specific gravity: 0.797
Sulfur, per cent: 0.16
Saybolt Universal Viscosity (100°F): 33.0

A.P.I. Gravity: 46.0°
Color: Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure — Barometer Reading 747.6 First drop, 75°F

Fraction No.	Cut at °C	°F	Per cent cut	Sum per cent	Sp. gr. 60/60°F	°A.P.I. 60°F	S.U. visc. 100°F	Cloud Test °F	C.I.[1]	K[2]
1	50	122	5.4	5.4	0.639	89.9	—	—		
2	75	167	4.8	10.2	0.678	77.2	—	—	11	12.40
3	100	212	8.0	18.2	0.724	64.0	—	—	23	11.93
4	125	257	9.1	27.3	0.743	59.0	—	—	23	11.86
5	150	302	7.3	34.6	0.758	55.2	—	—	23	11.87
6	175	347	7.5	42.1	0.773	51.6	—	—	23	11.90
7	200	392	6.3	48.4	0.788	48.1	—	—	24	11.90
8	225	437	5.9	54.3	0.803	44.7	—	—	25	11.83
9	250	482	6.2	60.5	0.818	41.5	—	—	27	11.83
10	275	527	7.4	67.9	0.830	39.0	—	—	28	11.84
Vacuum distillation at 40 mm.										
11	200	392	5.4	73.3	0.848	35.4	39	0	33	11.78
12	225	437	5.1	78.4	0.863	32.5	46	25	36	11.73
13	250	482	3.8	82.2	0.880	29.3	60	45	41	11.66
14	275	527	3.3	85.5	0.892	27.1	90	65	47	11.59
15	300	572	3.9	89.4	0.907	24.5	190	95	51	11.53

Carbon residue of residuum, 9.4% — Carbon residue of crude, 1.0%

APPROXIMATE SUMMARY

	Per cent	Sp. gr.	°A.P.I.	Viscosity
Light gasoline	18.2	0.687	74.5	
Gasoline and naphtha	48.4	0.735	61.0	
Kerosene	12.1	0.811	42.9	
Gas oil	16.7	0.843	36.4	below 50
Non-viscous lub. dist.	7.1	0.868-0.894	31.5-26.8	50-100
Medium lub. dist.	3.6	0.894-0.908	26.8-24.3	100-200
Viscous lub. dist.	1.5	0.908-0.915	24.3-23.2	above 200
Residuum	8.7	0.970	14.4	
Distillation loss	1.9			

[1]Correlation Index
[2]Characterization Factor

Lab. No. O-254

Oil from: McClosky "lime"
Iowa (Lower Miss.) series
Depth 3446 feet

Hamilton County
Sec. 26, T. 4 S., R. 7 E.
Bungay field

General Characteristics

Specific gravity: 0.841
Sulfur, per cent: 0.24
Saybolt Universal Viscosity (100°F): 45.0

A.P.I. Gravity: 36.8°
Color: Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure — Barometer Reading 747.8 First drop, 91°F

Fraction No.	Cut at °C	Cut at °F	Per cent cut	Sum per cent	Sp. gr. 60/60°F	°A.P.I. 60°F	S.U. visc. 100°F	Cloud Test °F	C.I.[1]	K[2]
1	50	122	2.3	2.3	0.644	88.2	—	—		
2	75	167	2.8	5.1	0.674	78.4	—	—	9.4	12.50
3	100	212	4.6	9.7	0.722	64.5	—	—	22	11.96
4	125	257	5.6	15.3	0.739	60.0	—	—	21	11.93
5	150	302	5.4	20.7	0.755	55.9	—	—	21	11.91
6	175	347	5.0	25.7	0.770	52.3	—	—	22	11.94
7	200	392	4.6	30.3	0.785	48.8	—	—	23	11.94
8	225	437	4.6	34.9	0.800	45.4	—	—	24	11.89
9	250	482	4.7	39.6	0.815	42.1	—	—	26	11.87
10	275	527	5.9	45.5	0.832	38.6	—	—	29	11.82
Vacuum distillation at 40 mm.										
11	200	392	3.2	48.7	0.843	36.4	39	10	30	11.84
12	225	437	4.1	52.8	0.853	34.4	45	30	31	11.87
13	250	482	5.0	57.8	0.863	32.5	58	40	33	11.88
14	275	527	4.7	62.5	0.877	29.8	85	60	40	11.79
15	300	572	5.7	68.2	0.890	27.5	150	80	43	11.76

Carbon residue of residuum, 3.2% — Carbon residue of crude, 1.1%

APPROXIMATE SUMMARY

	Per cent	Sp. gr.	°A.P.I.	Viscosity
Light gasoline	9.7	0.690	73.6	
Gasoline and naphtha	30.3	0.738	60.2	
Kerosene	9.3	0.808	43.6	
Gas oil	13.1	0.841	36.8	below 50
Non-viscous lub. dist.	8.7	0.857-0.880	33.6-29.3	50-100
Medium lub. dist.	6.8	0.880-0.897	29.3-26.3	100-200
Viscous lub. dist.	0.0			
Residuum	29.6	0.928	21.0	
Distillation loss	2.2			

[1]Correlation Index
[2]Characterization Factor

Lab. No. O-255

Oil from: McClosky "lime"
Iowa (Lower Miss.) series
Depth 2800 feet

Jefferson County
Sec. 22, T. 3 S., R. 2 E.
Marcoe field

General Characteristics

Specific gravity: 0.915
Sulfur, per cent: 0.54
Saybolt Universal Viscosity (100°F): 243.0

A.P.I. Gravity: 23.2°
Color: Brown

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure — Barometer Reading 749.1 First drop, 244°F

Fraction No.	Cut at °C	Cut at °F	Per cent cut	Sum per cent	Sp. gr. 60/60°F	°A.P.I. 60°F	S.U. visc. 100°F	Cloud Test °F	C.I.[1]	K[2]
1	50	122								
2	75	167								
3	100	212								
4	125	257								
5	150	302	1.5	1.5	0.765	53.5	—	—	26	11.77
6	175	347	1.8	3.3	0.783	49.2	—	—	28	11.75
7	200	392	2.5	5.8	0.803	44.7	—	—	31	11.65
8	225	437	3.1	8.9	0.820	41.1	—	—	33	11.58
9	250	482	4.1	13.0	0.837	37.6	—	—	36	11.60
10	275	527	6.1	19.1	0.852	34.6	—	—	39	11.55
Vacuum distillation at 40 mm.										
11	200	392	3.6	22.7	0.865	32.1	41	—	41	11.55
12	225	437	6.5	29.2	0.878	29.7	49	—	43	11.54
13	250	482	7.3	36.5	0.893	27.0	74	—	47	11.50
14	275	527	7.8	44.3	0.901	25.6	120	below 5[3]	48	11.55
15	300	572	9.0	53.3	0.916	23.0	210	25[3]	52	11.52

Carbon residue of residuum, 7.1% — Carbon residue of crude, 3.5%

APPROXIMATE SUMMARY

	Per cent	Sp. gr.	°A.P.I.	Viscosity
Light gasoline	0.0			
Gasoline and naphtha	5.8	0.787	48.3	
Kerosene	3.1	0.820	41.1	
Gas oil	17.3	0.856	33.8	below 50
Non-viscous lub. dist.	11.0	0.879-0.898	29.5-26.1	50-100
Medium lub. dist.	9.8	0.898-0.913	26.1-23.5	100-200
Viscous lub. dist.	6.3	0.913-0.924	23.5-21.6	above 200
Residuum	46.7	0.952	17.1	
Distillation loss	0.0			

[1]Correlation Index
[2]Characterization Factor
[3]Pour Point—no wax

Lab. No. O-256

Oil from: Bethel formation
Chester (Upper Miss.) series
Depth 1534 feet

Washington County
Sec. 27, T. 1 S., R. 1 W.
Irvington field

General Characteristics

Specific gravity: 0.837
Sulfur, per cent: 0.16
Saybolt Universal Viscosity (100°F): 39.0

A.P.I. Gravity: 37.6°
Color: Brown

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure — Barometer Reading 743.6 First drop, 80°F

Fraction No.	Cut at °C	Cut at °F	Per cent cut	Sum per cent	Sp. gr. 60/60°F	°A.P.I. 60°F	S.U. visc. 100°F	Cloud Test °F	C.I.[1]	K[2]
1	50	122	3.8	3.8	0.642	88.9	—	—		
2	75	167	3.6	7.4	0.672	79.1	—	—	8.4	12.56
3	100	212	5.5	12.9	0.720	65.0	—	—	21	12.00
4	125	257	6.0	18.9	0.740	59.7	—	—	22	11.91
5	150	302	5.6	24.5	0.755	55.9	—	—	21	11.91
6	175	347	5.1	29.6	0.773	51.6	—	—	23	11.90
7	200	392	4.7	34.3	0.788	48.1	—	—	24	11.90
8	225	437	5.0	39.0	0.803	44.7	—	—	25	11.83
9	250	482	5.1	44.4	0.815	42.1	—	—	26	11.87
10	275	527	6.1	50.5	0.830	39.0	—	—	28	11.84
Vacuum distillation at 40 mm.										
11	200	392	4.0	54.5	0.843	36.4	39	5	30	11.84
12	225	437	4.9	59.4	0.855	34.0	45	30	32	11.84
13	250	482	4.9	64.3	0.868	31.5	57	40	35	11.82
14	275	527	4.9	69.2	0.882	28.9	90	60	42	11.70
15	300	572	5.2	74.4	0.895	26.6	150	85	46	11.68

Carbon residue of residuum, 8.2% — Carbon residue of crude, 2.1%

APPROXIMATE SUMMARY

	Per cent	Sp. gr.	°A.P.I.	Viscosity
Light gasoline	12.9	0.684	75.4	
Gasoline and naphtha	34.3	0.733	61.6	
Kerosene	10.1	0.809	43.4	
Gas oil	14.6	0.841	36.8	below 50
Non-viscous lub. dist.	8.6	0.860-0.884	33.0-28.6	50-100
Medium lub. dist.	6.8	0.884-0.902	28.6-25.4	100-200
Viscous lub. dist.	0.0			
Residuum	21.9	0.967	14.8	
Distillation loss	3.7			

[1]Correlation Index
[2]Characterization Factor

Lab. No. O-257

Oil from: Palestine formation
Chester (Upper Miss.) series
Depth 2136 feet

Gallatin County
Sec. 33, T. 7 S., R. 8 E.
Omaha field

General Characteristics

Specific gravity: 0.899
Sulfur, per cent: 0.23
Saybolt Universal Viscosity (100°F): 109.0

A.P.I. Gravity: 25.9°
Color: Brown

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure — Barometer Reading 747.8 First drop, 146°F

Fraction No.	Cut at °C	Cut at °F	Per cent cut	Sum per cent	Sp. gr. 60/60°F	°A.P.I. 60°F	S.U. visc. 100°F	Cloud Test °F	C.I.[1]	K[2]
1	50	122								
2	75	167								
3	100	212	3.1	3.1	0.764	53.7	—	—		
4	125	257	3.0	6.1	0.775	51.1	—	—	38	11.37
5	150	302	2.4	8.5	0.785	48.8	—	—	36	11.47
6	175	347	2.5	11.0	0.798	45.8	—	—	35	11.51
7	200	392	3.1	14.1	0.823	40.4	—	—	41	11.39
8	225	437	3.6	17.7	0.845	36.0	—	—	45	11.26
9	250	482	4.1	21.8	0.855	34.0	—	—	45	11.33
10	275	527	6.2	28.0	0.865	32.1	—	—	45	11.38
Vacuum distillation at 40 mm.										
11	200	392	4.7	32.7	0.870	31.1	41	—	43	11.49
12	225	437	5.2	37.9	0.875	30.2	50	—	42	11.58
13	250	482	6.0	43.9	0.885	28.4	69	—	43	11.61
14	275	527	7.1	51.0	0.892	27.1	125	below 5[3]	47	11.60
15	300	572	7.4	58.4	0.905	24.9	200	15[3]	50	11.58

Carbon residue of residuum, 6.2% — Carbon residue of crude, 2.7%

APPROXIMATE SUMMARY

	Per cent	Sp. gr.	°A.P.I.	Viscosity
Light gasoline	3.1	0.764	53.7	
Gasoline and naphtha	14.1	0.789	47.8	
Kerosene	0.0			
Gas oil	21.2	0.862	32.7	below 50
Non-viscous lub. dist.	9.3	0.875-0.889	30.2-27.7	50-100
Medium lub. dist.	10.1	0.889-0.905	27.7-24.9	100-200
Viscous lub. dist.	3.7	0.905-0.912	24.9-23.7	above 200
Residuum	40.9	0.949	17.6	
Distillation loss	0.7			

[1]Correlation Index
[2]Characterization Factor
[3]Pour Point—trace wax

Lab. No. O-258

Oil from: McClosky "lime"
Iowa (Lower Miss.) series
Depth 3506 feet

Hamilton County
Sec. 3, T. 4 S., R. 6 E.
Belle Prairie field

General Characteristics

Specific gravity: 0.840
Sulfur, per cent: 0.12
Saybolt Universal Viscosity (100°F): 44.0

A.P.I. Gravity: 37.0°
Color: Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure — Barometer Reading 749.3 First drop, 88°F

Fraction No.	Cut at °C	Cut at °F	Per cent cut	Sum per cent	Sp. gr. 60/60°F	°A.P.I. 60°F	S.U. visc. 100°F	Cloud Test °F	C.I.[1]	K[2]
1	50	122	3.4	3.4	0.642	88.9	—	—		
2	75	167	3.4	6.8	0.672	79.1	—	—	8.4	12.56
3	100	212	4.6	11.4	0.715	66.4	—	—	19	12.10
4	125	257	6.1	17.5	0.740	59.7	—	—	22	11.91
5	150	302	5.4	22.9	0.758	55.2	—	—	23	11.87
6	175	347	4.6	27.5	0.773	51.6	—	—	23	11.90
7	200	392	4.0	31.5	0.788	48.1	—	—	24	11.90
8	225	437	4.3	35.8	0.803	44.7	—	—	25	11.83
9	250	482	4.7	40.5	0.818	41.5	—	—	27	11.83
10	275	527	5.6	46.1	0.830	39.0	—	—	28	11.84
Vacuum distillation at 40 mm.										
11	200	392	4.1	50.2	0.843	36.4	39	5	30	11.84
12	225	437	5.2	55.4	0.858	33.4	45	25	34	11.80
13	250	482	5.4	60.8	0.868	31.5	61	50	35	11.82
14	275	527	4.4	65.2	0.877	29.8	90	75	40	11.79
15	300	572	4.3	69.5	0.890	27.5	150	90	43	11.76

Carbon residue of residuum, 4.3% — Carbon residue of crude, 1.4%

APPROXIMATE SUMMARY

	Per cent	Sp. gr.	°A.P.I.	Viscosity
Light gasoline	11.4	0.680	76.6	
Gasoline and naphtha	31.5	0.732	61.8	
Kerosene	9.0	0.811	42.9	
Gas oil	13.9	0.842	36.6	below 50
Non-viscous lub. dist.	9.3	0.861-0.879	32.8-29.5	50-100
Medium lub. dist.	5.8	0.879-0.896	29.5-26.4	100-200
Viscous lub. dist.	0.0			
Residuum	28.7	0.934	20.0	
Distillation loss	1.8			

[1]Correlation Index
[2]Characterization Factor

Lab. No. O-259

Oil from: Bethel formation
Chester (Upper Miss.) series
Depth 1020 feet

Bond County
Sec. 10, T. 6 N., R. 2 W.
Woburn field

General Characteristics

Specific gravity: 0.843
Sulfur, per cent: 0.20
Saybolt Universal Viscosity (100°F): 44.0

A.P.I. Gravity: 36.4°
Color: Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure — Barometer Reading 748.4 First drop, 87°F

Fraction No.	Cut at °C	Cut at °F	Per cent cut	Sum per cent	Sp. gr. 60/60°F	°A.P.I. 60°F	S.U. visc. 100°F	Cloud Test °F	C.I.[1]	K[2]
1	50	122	1.7	1.7	0.645	87.9	—	—		
2	75	167	2.6	4.3	0.671	79.4	—	—	8.0	12.58
3	100	212	4.3	8.6	0.712	67.2	—	—	18	12.14
4	125	257	5.8	14.4	0.735	61.0	—	—	19	11.99
5	150	302	5.3	19.7	0.753	56.4	—	—	20	11.95
6	175	347	4.8	24.5	0.770	52.3	—	—	22	11.94
7	200	392	4.9	29.4	0.788	48.1	—	—	24	11.90
8	225	437	4.6	34.0	0.803	44.7	—	—	25	11.83
9	250	482	5.2	39.2	0.815	42.1	—	—	26	11.87
10	275	527	6.4	45.6	0.828	39.4	—	—	27	11.87
Vacuum distillation at 40 mm.										
11	200	392	4.6	50.2	0.843	36.4	39	15	30	11.84
12	225	437	5.7	55.9	0.853	34.4	44	35	31	11.87
13	250	482	5.4	61.3	0.863	32.5	55	50	33	11.88
14	275	527	5.9	67.2	0.872	30.8	80	70	38	11.84
15	300	572	6.0	73.2	0.889	27.7	130	90	43	11.77

Carbon residue of residuum, 5.3% — Carbon residue of crude, 1.5%

APPROXIMATE SUMMARY

	Per cent	Sp. gr.	°A.P.I.	Viscosity
Light gasoline	8.6	0.686	74.8	
Gasoline and naphtha	29.4	0.739	60.0	
Kerosene	9.8	0.809	43.4	
Gas oil	16.9	0.841	36.8	below 50
Non-viscous lub. dist.	10.6	0.858-0.879	33.4-29.5	50-100
Medium lub. dist.	6.5	0.879-0.897	29.5-26.3	100-200
Viscous lub. dist.	0.0			
Residuum	25.3	0.943	18.6	
Distillation loss	1.5			

[1]Correlation Index
[2]Characterization Factor

Lab. No. O-260

Oil from: Sandstone
Pennsylvanian system
Depth 598 feet

Montgomery County
Sec. 12, T. 10 N., R. 2 W.
Raymond field

General Characteristics

Specific gravity: 0.851
Sulfur, per cent: 0.22
Saybolt Universal Viscosity (100°F): 55.0

A.P.I. Gravity: 34.8°
Color: Brown

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure — Barometer Reading 744.2 First drop, 117°F

Fraction No.	Cut at °C	Cut at °F	Per cent cut	Sum per cent	Sp. gr. 60/60°F	°A.P.I. 60°F	S.U. visc. 100°F	Cloud Test °F	C.I.[1]	K[2]
1	50	122								
2	75	167	2.0	2.0	0.677	77.5	—	—	11	12.43
3	100	212	2.6	4.6	0.693	72.7	—	—	8.5	12.48
4	125	257	5.3	9.9	0.722	64.5	—	—	13	12.22
5	150	302	5.1	15.0	0.743	59.0	—	—	16	12.11
6	175	347	4.8	19.8	0.760	54.7	—	—	17	12.09
7	200	392	4.8	24.6	0.778	50.4	—	—	19	12.05
8	225	437	5.1	29.7	0.795	46.5	—	—	22	11.97
9	250	482	5.9	35.6	0.810	43.2	—	—	23	11.94
10	275	527	6.7	42.3	0.823	40.4	—	—	25	11.94
Vacuum distillation at 40 mm.										
11	200	392	3.4	45.7	0.834	38.2	39	5	26	11.97
12	225	437	5.4	51.1	0.845	36.0	45	30	28	11.99
13	250	482	5.1	56.2	0.857	33.6	56	55	30	11.97
14	275	527	5.6	61.8	0.868	31.5	80	70	36	12.00
15	300	572	7.3	69.1	0.881	29.1	140	85	38	11.98

Carbon residue of residuum, 9.7% — Carbon residue of crude, 3.3%

APPROXIMATE SUMMARY

	Per cent	Sp. gr.	°A.P.I.	Viscosity
Light gasoline	4.6	0.686	74.8	
Gasoline and naphtha	24.6	0.738	60.2	
Kerosene	17.7	0.811	42.9	
Gas oil	8.4	0.840	37.0	below 50
Non-viscous lub. dist.	10.5	0.850-0.872	35.0-30.8	50-100
Medium lub. dist.	7.9	0.872-0.888	30.8-27.9	100-200
Viscous lub. dist.	0.0			
Residuum	30.6	0.951	17.3	
Distillation loss	0.3			

[1] Correlation Index
[2] Characterization Factor

Lab. No. O-261

Oil from: Bethel formation
Chester (Upper Miss.) series
Depth 1034 feet

Washington County
Sec. 29, T. 3 S., R. 4 W.
McKinley field

General Characteristics

Specific gravity: 0.806
Sulfur, per cent: 0.18
Saybolt Universal Viscosity (100°F): 36.0

A.P.I. Gravity: 44.1°
Color: Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure — Barometer Reading 745.3 First drop, 92°F

Fraction No.	Cut at °C	Cut at °F	Per cent cut	Sum per cent	Sp. gr 60/60°F	°A.P.I. 60°F	S.U. visc. 100°F	Cloud Test °F	C.I.[1]	K[2]
1	50	122	4.9	4.9	0.639	89.9	—	—		
2	75	167	5.1	10.0	0.667	80.6	—	—	6.1	12.68
3	100	212	6.4	16.4	0.705	69.2	—	—	14	12.26
4	125	257	8.3	24.7	0.732	61.8	—	—	18	12.04
5	150	302	6.2	30.9	0.752	56.7	—	—	20	11.97
6	175	347	5.9	36.8	0.774	51.3	—	—	23	11.88
7	200	392	5.2	42.0	0.792	47.2	—	—	26	11.84
8	225	437	4.9	46.9	0.808	43.6	—	—	28	11.75
9	250	482	5.2	52.1	0.820	41.1	—	—	28	11.81
10	275	527	5.9	58.0	0.838	37.4	—	—	32	11.74
Vacuum distillation at 40 mm.										
11	200	392	3.8	61.8	0.848	35.4	39	5	33	11.78
12	225	437	4.5	66.3	0.858	33.4	45	30	34	11.80
13	250	482	4.4	70.7	0.868	31.5	58	55	35	11.82
14	275	527	3.9	74.6	0.881	29.1	85	70	41	11.73
15	300	572	5.1	79.7	0.892	27.1	160	85	45	11.71

Carbon residue of residuum, 7.8% — Carbon residue of crude, 1.6%

APPROXIMATE SUMMARY

	Per cent	Sp. gr.	°A.P.I.	Viscosity
Light gasoline	16.4	0.673	78.8	
Gasoline and naphtha	42.0	0.725	63.7	
Kerosene	10.1	0.814	42.3	
Gas oil	13.7	0.846	35.8	below 50
Non-viscous lub. dist.	7.8	0.862-0.883	32.7-28.8	50-100
Medium lub. dist.	6.0	0.883-0.898	28.8-26.1	100-200
Viscous lub. dist.	0.1	0.898-0.898	26.1-26.1	above 200
Residuum	16.7	0.949	17.6	
Distillation loss	3.6			

[1]Correlation Index
[2]Characterization Factor

Lab. No. O-262

Oil from: McClosky "lime"
Iowa (Lower Miss.) series
Depth 2503 feet

Effingham County
Sec. 22, T. 6 N., R. 5 E.
Mason field

General Characteristics

Specific gravity: 0.833
Sulfur, per cent: 0.21
Saybolt Universal Viscosity (100°F): 44.0

A.P.I. Gravity: 38.4°
Color: Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure — Barometer Reading 745.6 First drop, 93°F

Fraction No.	Cut at °C	Cut at °F	Per cent cut	Sum per cent	Sp. gr. 60/60°F	°A.P.I. 60°F	S.U. visc. 100°F	Cloud Test °F	C.I.[1]	K[2]
1	50	122	2.7	2.7	0.642	88.9	—	—		
2	75	167	3.2	5.9	0.664	81.6	—	—	4.6	12.75
3	100	212	4.8	10.7	0.712	67.2	—	—	18	12.14
4	125	257	6.1	16.8	0.733	61.6	—	—	18	12.02
5	150	302	5.4	22.2	0.754	56.2	—	—	21	11.93
6	175	347	5.1	27.3	0.773	51.6	—	—	23	11.90
7	200	392	4.6	31.9	0.790	47.6	—	—	25	11.87
8	225	437	4.7	36.6	0.805	44.3	—	—	26	11.80
9	250	482	5.1	41.7	0.819	41.3	—	—	28	11.82
10	275	527	5.4	47.1	0.835	38.0	—	—	31	11.78
Vacuum distillation at 40 mm.										
11	200	392	4.0	51.1	0.848	35.4	38	5	33	11.78
12	225	437	5.1	56.2	0.855	34.0	44	30	32	11.84
13	250	482	4.8	61.0	0.865	32.1	57	55	34	11.86
14	275	527	5.0	66.0	0.873	30.6	85	70	39	11.82
15	300	572	5.7	71.7	0.885	28.4	140	85	41	11.82

Carbon residue of residuum, 7.6% — Carbon residue of crude, 2.3%

APPROXIMATE SUMMARY

	Per cent	Sp. gr.	°A.P.I.	Viscosity
Light gasoline	10.7	0.680	76.6	
Gasoline and naphtha	31.9	0.733	61.6	
Kerosene	9.8	0.812	42.8	
Gas oil	14.2	0.845	36.0	below 50
Non-viscous lub. dist.	9.0	0.860-0.876	33.0-30.0	50-100
Medium lub. dist.	6.8	0.876-0.891	30.0-27.3	100-200
Viscous lub. dist.	0.0			
Residuum	25.7	0.954	16.8	
Distillation loss	2.6			

[1]Correlation Index
[2]Characterization Factor

Lab. No. O-263

Oil from: Tar Springs formation
Chester (Upper Miss.) series
Depth 2148 feet

Franklin County
Sec. 24, T. 6 S., R. 2 E.
Benton field

General Characteristics

Specific gravity: 0.817
Sulfur, per cent: 0.12
Saybolt Universal Viscosity (100°F): 40.0

A.P.I. Gravity: 41.7°
Color Green:

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure — Barometer Reading 746.2 First drop, 89°F

Fraction No.	Cut at °C	Cut at °F	Per cent cut	Sum per cent	Sp. gr. 60/60°F	°A.P.I. 60°F	S.U. visc. 100°F	Cloud Test °F	C.I.[1]	K[2]
1	50	122	3.3	3.3	0.644	88.2	—	—		
2	75	167	3.6	6.9	0.662	82.2	—	—	3.7	12.79
3	100	212	5.1	12.0	0.700	70.6	—	—	12	12.35
4	125	257	6.4	18.4	0.728	62.9	—	—	16	12.11
5	150	302	5.8	24.2	0.748	57.7	—	—	18	12.03
6	175	347	5.2	29.4	0.768	52.8	—	—	21	11.97
7	200	392	4.9	34.3	0.785	48.8	—	—	23	11.94
8	225	437	4.9	39.2	0.800	45.4	—	—	24	11.89
9	250	482	5.1	44.3	0.813	42.6	—	—	25	11.90
10	275	527	5.8	50.1	0.828	39.4	—	—	27	11.87
Vacuum distillation at 40 mm.										
11	200	392	3.9	54.0	0.840	37.0	38	5	29	11.89
12	225	437	4.6	58.6	0.853	34.4	44	25	31	11.87
13	250	482	4.5	63.1	0.865	32.1	57	50	34	11.86
14	275	527	4.6	67.7	0.871	31.0	85	70	37	11.85
15	300	572	5.7	73.4	0.885	28.4	130	80	41	11.82

Carbon residue of residuum, 7.0% — Carbon residue of crude, 1.9%

APPROXIMATE SUMMARY

	Per cent	Sp. gr.	°A.P.I.	Viscosity
Light gasoline	12.0	0.673	78.8	
Gasoline and naphtha	34.0	0.733	61.6	
Kerosene	10.0	0.807	43.8	
Gas oil	14.2	0.839	37.2	below 50
Non-viscous lub. dist.	8.6	0.859-0.876	33.2-30.0	50-100
Medium lub. dist.	6.3	0.876-0.893	30.0-27.0	100-200
Viscous lub. dist.	0.0			
Residuum	22.7	0.940	19.0	
Distillation loss	3.9			

[1]Correlation Index
[2]Characterization Factor

Lab. No. O-264

Oil from: McClosky "lime"
Iowa (Lower Miss.) series
Depth 3325 feet

Edwards County
Sec. 13, T. 1 S., R. 10 E.
Bone Gap field

General Characteristics

Specific gravity: 0.823
Sulfur, per cent: 0.33
Saybolt Universal Viscosity (100°F): 43.0

A.P.I. Gravity: 40.5°
Color: Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure — Barometer Reading 744.0 First drop, 88°F

Fraction No.	Cut at °C	Cut at °F	Per cent cut	Sum per cent	Sp. gr. 60/60°F	°A.P.I. 60°F	S.U. visc. 100°F	Cloud Test °F	C.I.[1]	K[2]
1	50	122	4.1	4.1	0.650	86.2	—	—		
2	75	167	3.9	8.0	0.668	80.3	—	—	6.5	12.65
3	100	212	5.4	13.4	0.702	70.1	—	—	13	12.31
4	125	257	5.9	19.3	0.732	61.8	—	—	18	12.04
5	150	302	5.0	24.3	0.752	56.7	—	—	20	11.97
6	175	347	4.7	29.0	0.779	50.2	—	—	26	11.80
7	200	392	4.1	33.1	0.800	45.4	—	—	30	11.70
8	225	437	4.4	37.5	0.815	42.1	—	—	31	11.66
9	250	482	4.5	42.0	0.825	40.0	—	—	31	11.74
10	275	527	5.5	47.5	0.835	38.0	—	—	31	11.78
Vacuum distillation at 40 mm.										
11	200	392	3.3	50.8	0.845	36.0	39	5	31	11.82
12	225	437	4.5	55.3	0.855	34.0	45	25	32	11.84
13	250	482	4.5	59.8	0.865	32.1	59	50	34	11.86
14	275	527	4.0	63.8	0.876	30.0	90	65	39	11.81
15	300	572	5.7	69.5	0.885	28.4	150	80	41	11.82

Carbon residue of residuum, 5.4% — Carbon residue of crude, 1.6%

APPROXIMATE SUMMARY

	Per cent	Sp. gr.	°A.P.I.	Viscosity
Light gasoline	13.4	0.676	77.8	
Gasoline and naphtha	33.1	0.728	62.9	
Kerosene	8.9	0.820	41.1	
Gas oil	12.7	0.843	36.4	below 50
Non-viscous lub. dist.	7.9	0.859-0.878	33.2-29.7	50-100
Medium lub. dist.	6.9	0.878-0.890	29.7-27.5	100-200
Viscous lub. dist.	0.0			
Residuum	26.2	0.930	20.7	
Distillation loss	4.3			

[1]Correlation Index
[2]Characterization Factor

Lab. No. O-265

Oil from: Tar Springs formation
Chester (Upper Miss.) series
Depth 2266 feet

White County
Sec. 10, T. 7 S., R. 9 E.
S. W. Herald Pool Extension

General Characteristics

Specific gravity: 0.839
Sulfur, per cent: 0.24
Saybolt Universal Viscosity (100°F): 44.0

A.P.I. Gravity: 37.2°
Color: Brown

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure — Barometer Reading 746.1 First drop, 84°F

Fraction No.	Cut at °C	Cut at °F	Per cent cut	Sum per cent	Sp. gr. 60/60°F	°A.P.I. 60°F	S.U. visc. 100°F	Cloud Test °F	C.I.[1]	K[2]
1	50	122	2.8	2.8	0.652	85.5	—	—		
2	75	167	3.0	5.8	0.665	81.3	—	—	5.1	12.72
3	100	212	5.3	11.1	0.702	70.1	—	—	13	12.31
4	125	257	6.0	17.1	0.739	60.0	—	—	21	11.93
5	150	302	5.8	22.9	0.755	55.9	—	—	21	11.91
6	175	347	4.6	27.5	0.779	50.2	—	—	26	11.80
7	200	392	4.4	31.9	0.795	46.5	—	—	27	11.79
8	225	437	4.6	36.5	0.807	43.8	—	—	27	11.77
9	250	482	5.0	41.5	0.820	41.1	—	—	28	11.81
10	275	527	6.6	48.1	0.833	38.4	—	—	30	11.81
Vacuum distillation at 40 mm.										
11	200	392	3.9	52.0	0.847	35.6	39	5	32	11.80
12	225	437	4.9	56.9	0.860	33.0	44	30	35	11.77
13	250	482	4.4	61.3	0.870	31.1	57	50	36	11.79
14	275	527	5.1	66.4	0.881	29.1	90	65	41	11.73
15	300	572	6.4	72.8	0.897	26.3	170	85	46	11.66

Carbon residue of residuum, 10.0% — Carbon residue of crude, 2.9%

APPROXIMATE SUMMARY

	Per cent	Sp. gr.	°A.P.I.	Viscosity
Light gasoline	11.1	0.679	76.9	
Gasoline and naphtha	31.9	0.735	61.0	
Kerosene	9.6	0.814	42.3	
Gas oil	15.1	0.845	36.0	below 50
Non-viscous lub. dist.	8.0	0.865-0.883	32.1-28.8	50-100
Medium lub. dist.	7.2	0.883-0.903	28.8-25.2	100-200
Viscous lub. dist.	1.0	0.903-0.906	25.2-24.7	above 200
Residuum	24.5	0.961	15.7	
Distillation loss	2.7			

[1]Correlation Index
[2]Characterization Factor

Lab. No. O-266

Oil from: McClosky "lime"
Iowa (Lower Miss.) series
Depth 3359 feet

Hamilton County
Sec. 34, T. 3 S., R. 5 E.
Dahlgren field

General Characteristics

Specific gravity: 0.829
Sulfur, per cent: 0.16
Saybolt Universal Viscosity (100°F): 41.0

A.P.I. Gravity: 39.2°
Color: Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure — Barometer Reading 746.3 First drop, 85°F

Fraction No.	Cut at °C	Cut at °F	Per cent cut	Sum per cent	Sp. gr. 60/60°F	°A.P.I. 60°F	S.U. visc. 100°F	Cloud Test °F	C.I.[1]	K[2]
1	50	122	3.9	3.9	0.649	86.5	—	—		
2	75	167	3.5	7.4	0.668	80.3	—	—	6.5	12.65
3	100	212	5.1	12.5	0.708	68.4	—	—	16	12.20
4	125	257	6.1	18.6	0.735	61.0	—	—	19	11.99
5	150	302	5.7	24.3	0.755	55.9	—	—	21	11.91
6	175	347	5.0	29.3	0.774	51.3	—	—	23	11.88
7	200	392	4.9	34.2	0.790	47.6	—	—	25	11.87
8	225	437	4.9	39.1	0.805	44.3	—	—	26	11.80
9	250	482	4.7	43.8	0.820	41.1	—	—	28	11.81
10	275	527	6.3	50.1	0.835	38.0	—	—	31	11.78
Vacuum distillation at 40 mm.										
11	200	392	3.3	53.4	0.845	36.0	38	5	31	11.82
12	225	437	4.1	57.5	0.855	34.0	46	25	32	11.84
13	250	482	4.6	62.1	0.865	32.1	56	50	34	11.86
14	275	527	4.5	66.6	0.876	30.0	85	65	39	11.81
15	300	572	5.3	71.9	0.887	28.0	150	80	42	11.79

Carbon residue of residuum, 6.5% — Carbon residue of crude, 1.8%

APPROXIMATE SUMMARY

	Per cent	Sp. gr.	°A.P.I.	Viscosity
Light gasoline	12.5	0.678	77.2	
Gasoline and naphtha	34.2	0.731	62.1	
Kerosene	9.6	0.812	42.8	
Gas oil	13.4	0.843	36.4	below 50
Non-viscous lub. dist.	8.4	0.859-0.879	33.2-29.5	50-100
Medium lub. dist.	6.3	0.879-0.893	29.5-27.0	100-200
Viscous lub. dist.	0.0			
Residuum	23.8	0.941	18.9	
Distillation loss	4.3			

[1]Correlation Index
[2]Characterization Factor

Lab. No. O-267

Oil from: Tar Springs formation
Chester (Upper Miss.) series
Depth 2080 feet

Franklin County
Sec. 12, T. 7 S., R. 2 E.
W. Frankfort field

General Characteristics

Specific gravity: 0.833
Sulfur, per cent: 0.13
Saybolt Universal Viscosity (100°F): 44.0

A.P.I. Gravity: 38.4°
Color: Dark Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure — Barometer Reading 746.2 First drop, 87°F

Fraction No.	Cut at °C	Cut at °F	Per cent cut	Sum per cent	Sp. gr. 60/60°F	°A.P.I. 60°F	S.U. visc. 100°F	Cloud Test °F	C.I.[1]	K[2]
1	50	122	2.9	2.9	0.645	87.9	—	—		
2	75	167	3.7	6.6	0.665	81.3	—	—	5.1	12.72
3	100	212	4.6	11.2	0.705	69.2	—	—	14	12.26
4	125	257	6.3	17.5	0.733	61.6	—	—	18	12.02
5	150	302	5.7	23.2	0.755	55.9	—	—	21	11.91
6	175	347	5.1	28.3	0.773	51.6	—	—	23	11.90
7	200	392	4.6	32.9	0.788	48.1	—	—	24	11.90
8	225	437	5.0	37.9	0.802	44.9	—	—	25	11.85
9	250	482	5.1	43.0	0.818	41.5	—	—	27	11.83
10	275	527	6.0	49.0	0.833	38.4	—	—	30	11.81
Vacuum distillation at 40 mm.										
11	200	392	4.1	53.1	0.843	36.4	39	5	30	11.84
12	225	437	4.6	57.7	0.853	34.4	43	30	31	11.87
13	250	482	4.8	62.5	0.865	32.1	55	55	34	11.86
14	275	527	4.5	67.0	0.871	31.0	80	70	37	11.85
15	300	572	5.7	72.7	0.885	28.4	130	85	40	11.83

Carbon residue of residuum, 7.0% — Carbon residue of crude, 2.0%

APPROXIMATE SUMMARY

	Per cent	Sp. gr.	°A.P.I.	Viscosity
Light gasoline	11.2	0.676	77.8	
Gasoline and naphtha	32.9	0.731	62.1	
Kerosene	10.1	0.810	43.2	
Gas oil	15.1	0.843	36.4	below 50
Non-viscous lub. dist.	8.8	0.860-0.877	33.0-29.8	50-100
Medium lub. dist.	5.8	0.877-0.893	29.8-27.0	100-200
Viscous lub. dist.	0.0			
Residuum	25.2	0.942	18.7	
Distillation loss	2.1			

[1] Correlation Index
[2] Characterization Factor

Lab. No. O-268

Oil from: Bethel formation
Chester (Upper Miss.) series
Depth 2959 feet

Hamilton County
Sec. 27, T. 5 S., R. 6 E.
Hoodville field

General Characteristics

Specific gravity: 0.834
Sulfur, per cent: 0.14
Saybolt Universal Viscosity (100°F): 43.0

A.P.I. Gravity: 38.2°
Color: Dark Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure — Barometer Reading 746.9 First drop, 91°F

Fraction No.	Cut at °C	Cut at °F	Per cent cut	Sum per cent	Sp. gr. 60/60°F	°A.P.I. 60°F	S.U. visc. 100°F	Cloud Test °F	C.I.[1]	K[2]
1	50	122	2.5	2.5	0.649	86.5	—	—		
2	75	167	2.7	5.2	0.668	80.3	—	—	6.5	12.65
3	100	212	5.0	10.2	0.708	68.4	—	—	16	12.20
4	125	257	6.2	16.4	0.735	61.0	—	—	19	11.99
5	150	302	5.6	22.0	0.753	56.4	—	—	20	11.95
6	175	347	4.9	26.9	0.773	51.6	—	—	23	11.90
7	200	392	4.9	31.8	0.793	46.9	—	—	26	11.82
8	225	437	4.9	36.7	0.808	43.6	—	—	28	11.75
9	250	482	5.0	41.7	0.820	41.1	—	—	28	11.81
10	275	527	6.1	47.8	0.835	38.0	—	—	31	11.78
Vacuum distillation at 40 mm.										
11	200	392	3.9	51.7	0.843	36.4	39	5	30	11.84
12	225	437	4.7	56.4	0.854	34.2	44	25	32	11.86
13	250	482	5.1	61.5	0.865	32.1	58	50	34	11.86
14	275	527	5.0	66.5	0.878	29.7	85	65	40	11.77
15	300	572	5.4	71.9	0.890	27.5	130	80	43	11.77

Carbon residue of residuum, 5.4% — Carbon residue of crude, 1.6%

APPROXIMATE SUMMARY

	Per cent	Sp. gr.	°A.P.I.	Viscosity
Light gasoline	10.2	0.683	75.7	
Gasoline and naphtha	31.8	0.736	60.8	
Kerosene	9.9	0.814	42.3	
Gas oil	14.5	0.843	36.4	below 50
Non-viscous lub. dist.	9.5	0.859-0.882	33.2-28.9	50-100
Medium lub. dist.	6.2	0.882-0.897	28.9-26.3	100-200
Viscous lub. dist.	0.0			
Residuum	25.9	0.939	19.2	
Distillation loss	2.2			

[1]Correlation Index
[2]Characterization Factor

Lab. No. O-269

Oil from: Tar Springs formation
Chester (Upper Miss.) series
Depth 2129 feet

White County
Sec. 19, T. 7 S., R. 11 E.
New Haven field

General Characteristics

Specific gravity: 0.843
Sulfur, per cent: 0.27
Saybolt Universal Viscosity (100°F): 42.0

A.P.I. Gravity: 36.4°
Color: Greenish brown

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure — Barometer Reading 744.2 First drop, 85°F

Fraction No.	Cut at °C	Cut at °F	Per cent cut	Sum per cent	Sp. gr. 60/60°F	°A.P.I. 60°F	S.U. visc. 100°F	Cloud Test °F	C.I.[1]	K[2]
1	50	122	2.8	2.8	0.649	86.5	—	—		
2	75	167	3.7	6.5	0.670	79.7	—	—	7.5	12.60
3	100	212	6.1	12.6	0.708	68.4	—	—	16	12.20
4	125	257	7.2	19.8	0.740	59.7	—	—	22	11.91
5	150	302	5.7	25.5	0.758	55.2	—	—	23	11.87
6	175	347	4.6	30.1	0.778	50.4	—	—	25	11.82
7	200	392	4.7	34.8	0.798	45.8	—	—	29	11.74
8	225	437	4.5	39.3	0.815	42.1	—	—	31	11.66
9	250	482	5.0	44.3	0.829	39.2	—	—	32	11.70
10	275	527	6.4	50.7	0.845	36.0	—	—	35	11.64
Vacuum distillation at 40 mm.										
11	200	392	3.6	54.3	0.854	34.2	39	below 5	36	11.69
12	225	437	4.8	59.1	0.865	32.1	45	25	37	11.70
13	250	482	4.9	64.0	0.878	29.7	59	50	40	11.68
14	275	527	4.6	68.6	0.891	27.3	90	65	43	11.68
15	300	572	6.7	75.3	0.909	24.2	180	80	48	11.61

Carbon residue of residuum, 9.6% — Carbon residue of crude, 2.6%

APPROXIMATE SUMMARY

	Per cent	Sp. gr.	°A.P.I.	Viscosity
Light gasoline	12.6	0.684	75.4	
Gasoline and naphtha	34.8	0.735	61.0	
Kerosene	4.5	0.815	42.1	
Gas oil	19.1	0.847	35.6	below 50
Non-viscous lub. dist.	8.5	0.870-0.893	31.1-27.0	50-100
Medium lub. dist.	6.4	0.893-0.913	27.0-23.5	100-200
Viscous lub. dist.	2.0	0.913-0.920	23.5-22.3	above 200
Residuum	23.3	0.971	14.2	
Distillation loss	1.4			

[1]Correlation Index
[2]Characterization Factor

Lab. No. O-270

Oil from: Weiler sand
Chester (Upper Miss.) series
Depth 1370 feet

Marion County
Sec. 34, T. 4 N., R. 1 E.
East Patoka field

General Characteristics

Specific gravity: 0.845
Sulfur, per cent: 0.18
Saybolt Universal Viscosity (100°F): 46.0

A.P.I. Gravity: 36.0°
Color: Dark Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure — Barometer Reading 744.8 First drop, 89°F

Fraction No.	Cut at °C	Cut at °F	Per cent cut	Sum per cent	Sp. gr. 60/60°F	°A.P.I. 60°F	S.U. visc. 100°F	Cloud Test °F	C.I.[1]	K[2]
1	50	122	2.0	2.0	0.645	87.9	—	—		
2	75	167	2.3	4.3	0.665	81.3	—	—	5.1	12.72
3	100	212	4.6	8.9	0.703	69.8	—	—	13	12.30
4	125	257	6.1	15.0	0.728	62.9	—	—	16	12.11
5	150	302	5.5	20.5	0.748	57.7	—	—	18	12.03
6	175	347	5.4	25.9	0.765	53.5	—	—	19	12.01
7	200	392	5.4	31.3	0.780	49.9	—	—	20	12.01
8	225	437	5.0	36.3	0.803	44.7	—	—	25	11.83
9	250	482	5.2	41.5	0.820	41.1	—	—	28	11.81
10	275	527	6.3	47.8	0.833	38.4	—	—	30	11.81
Vacuum distillation at 40 mm.										
11	200	392	4.3	52.1	0.843	36.4	39	5	30	11.84
12	225	437	5.0	57.1	0.855	34.0	45	30	32	11.84
13	250	482	5.3	62.4	0.865	32.1	56	55	34	11.86
14	275	527	5.0	67.4	0.878	29.7	85	70	40	11.77
15	300	572	6.0	73.4	0.890	27.5	140	85	43	11.77

Carbon residue of residuum, 10.5% — Carbon residue of crude, 3.2%

APPROXIMATE SUMMARY

	Per cent	Sp. gr.	°A.P.I.	Viscosity
Light gasoline	8.9	0.680	76.6	
Gasoline and naphtha	31.3	0.733	61.6	
Kerosene	10.2	0.812	42.8	
Gas oil	15.6	0.843	36.4	below 50
Non-viscous lub. dist.	9.3	0.860-0.881	33.0-29.1	50-100
Medium lub. dist.	7.0	0.881-0.897	29.1-26.3	100-200
Viscous lub. dist.	0.0			
Residuum	25.8	0.964	15.3	
Distillation loss	0.8			

[1]Correlation Index
[2]Characterization Factor

Lab. No. O-272

Oil from: Aux Vases formation
Chester (Upper Miss.) series
Depth 3081 feet

Hamilton County
Sec. 3, T. 6 S., R. 6 E
Hoodville field

General Characteristics

Specific gravity: 0.828
Sulfur, per cent: 0.17
Saybolt Universal Viscosity (100°F): 42.0

A.P.I. Gravity: 39.4°
Color: Dark Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure — Barometer Reading 745.2 First drop, 87°F

Fraction No.	Cut at °C	Cut at °F	Per cent cut	Sum per cent	Sp. gr. 60/60°F	°A.P.I. 60°F	S.U. visc. 100°F	Cloud Test °F	C.I.[1]	K[2]
1	50	122	3.7	3.7	0.647	87.2	—	—		
2	75	167	3.1	6.8	0.668	80.3	—	—	6.5	12.65
3	100	212	4.8	11.6	0.708	68.4	—	—	16	12.20
4	125	257	6.0	17.6	0.737	60.5	—	—	20	11.96
5	150	302	5.6	23.2	0.755	55.9	—	—	21	11.91
6	175	347	5.0	28.2	0.773	51.6	—	—	23	11.90
7	200	392	4.8	33.0	0.790	47.6	—	—	25	11.87
8	225	437	4.6	37.6	0.805	44.3	—	—	26	11.80
9	250	482	4.7	42.3	0.818	41.5	—	—	27	11.83
10	275	527	5.7	48.0	0.834	38.2	—	—	30	11.80
Vacuum distillation at 40 mm.										
11	200	392	4.3	52.3	0.843	36.4	38	5	30	11.84
12	225	437	4.6	56.9	0.853	34.4	45	25	31	11.87
13	250	482	4.9	61.8	0.863	32.5	58	50	33	11.88
14	275	527	4.4	66.2	0.873	30.6	85	65	39	11.82
15	300	572	5.8	72.0	0.885	28.4	140	80	40	11.83

Carbon residue of residuum, 6.1% — Carbon residue of crude, 1.8%

APPROXIMATE SUMMARY

	Per cent	Sp. gr.	°A.P.I.	Viscosity
Light gasoline	11.6	0.678	77.2	
Gasoline and naphtha	33.0	0.732	61.8	
Kerosene	9.3	0.812	42.8	
Gas oil	14.1	0.842	36.6	below 50
Non-viscous lub. dist.	9.0	0.857-0.877	33.6-29.8	50-100
Medium lub. dist.	6.6	0.877-0.892	29.8-27.1	100-200
Viscous lub. dist.	0.0			
Residuum	25.6	0.940	19.0	
Distillation loss	2.4			

[1]Correlation Index
[2]Characterization Factor

Lab. No. O-273

Oil from: Weiler sand
Chester (Upper Miss.) series
Depth 1108 feet

Clinton County
Sec. 16, T. 1 N., R. 2 W.
Posey field

General Characteristics

Specific gravity: 0.846
Sulfur, per cent: 0.17
Saybolt Universal Viscosity (100°F): 46.0

A.P.I. Gravity: 35.8°
Color: Dark Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure — Barometer Reading 744.8 First drop, 113°F

Fraction No.	Cut at °C	Cut at °F	Per cent cut	Sum per cent	Sp. gr. 60/60°F	°A.P.I. 60°F	S.U. visc. 100°F	Cloud Test °F	C.I.[1]	K[2]
1	50	122								
2	75	167	2.7	2.7	0.663	81.9	—	—	4.2	12.77
3	100	212	4.0	6.7	0.700	70.6	—	—	12	12.35
4	125	257	6.7	13.4	0.727	63.1	—	—	16	12.13
5	150	302	6.2	19.6	0.747	57.9	—	—	18	12.05
6	175	347	5.4	25.0	0.765	53.5	—	—	19	12.01
7	200	392	5.0	30.0	0.783	49.2	—	—	21	11.96
8	225	437	5.0	35.0	0.798	45.8	—	—	23	11.92
9	250	482	5.3	40.3	0.815	42.1	—	—	26	11.87
10	275	527	6.4	46.7	0.830	39.0	—	—	28	11.84
Vacuum distillation at 40 mm.										
11	200	392	4.6	51.3	0.840	37.0	38	10	29	11.89
12	225	437	5.3	56.6	0.850	35.0	45	30	30	11.91
13	250	482	5.2	61.8	0.860	33.0	55	60	31	11.92
14	275	527	5.1	66.9	0.872	30.8	80	70	38	11.83
15	300	572	6.6	73.5	0.885	28.4	140	85	40	11.83

Carbon residue of residuum, 10.5% — Carbon residue of crude, 3.2%

APPROXIMATE SUMMARY

	Per cent	Sp. gr.	°A.P.I.	Viscosity
Light gasoline	6.7	0.685	75.1	
Gasoline and naphtha	30.0	0.738	60.2	
Kerosene	10.3	0.807	43.8	
Gas oil	16.2	0.839	37.2	below 50
Non-viscous lub. dist.	9.7	0.855-0.876	34.0-30.0	50-100
Medium lub. dist.	7.3	0.876-0.893	30.0-27.0	100-200
Viscous lub. dist.	0.0			
Residuum	26.3	0.959	16.1	
Distillation loss	0.2			

[1]Correlation Index
[2]Characterization Factor

Lab. No. O-274

Oil from: Palestine formation
Chester (Upper Miss.) series
Depth 2018 feet

White County
Sec. 7, T. 6 S., R. 11 E.
Maunie field

General Characteristics

Specific gravity: 0.856
Sulfur, per cent: 0.28
Saybolt Universal Viscosity (100°F): 47.0

A.P.I. Gravity: 33.8°
Color: Brown

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure — Barometer Reading 742.4 First drop, 108°F

Fraction No.	Cut at °C	Cut at °F	Per cent cut	Sum per cent	Sp. gr. 60/60°F	°A.P.I. 60°F	S.U. visc. 100°F	Cloud Test °F	C.I.[1]	K[2]
1	50	122								
2	75	167	2.8	2.8	0.662	82.2	—	—	3.7	12.79
3	100	212	3.9	6.7	0.718	65.6	—	—	20	12.04
4	125	257	6.4	13.1	0.740	59.7	—	—	22	11.91
5	150	302	5.8	18.9	0.755	55.9	—	—	21	11.91
6	175	347	5.2	24.1	0.772	51.8	—	—	23	11.91
7	200	392	5.3	29.4	0.787	48.3	—	—	24	11.91
8	225	437	4.9	34.3	0.804	44.5	—	—	26	11.81
9	250	482	5.2	39.5	0.818	41.5	—	—	27	11.83
10	275	527	6.5	46.0	0.833	38.4	—	—	30	11.81
Vacuum distillation at 40 mm.										
11	200	392	5.0	51.0	0.845	36.0	41	10	31	11.82
12	225	437	5.1	56.1	0.863	32.5	47	30	36	11.73
13	250	482	5.3	61.4	0.878	29.7	64	55	40	11.68
14	275	527	5.2	66.6	0.885	28.4	95	70	43	11.67
15	300	572	6.9	73.5	0.900	25.7	200	90	47	11.63

Carbon residue of residuum, 15.7% — Carbon residue of crude, 4.6%

APPROXIMATE SUMMARY

	Per cent	Sp. gr.	°A.P.I.	Viscosity
Light gasoline	6.7	0.695	72.1	
Gasoline and naphtha	29.4	0.747	57.9	
Kerosene	10.1	0.811	42.9	
Gas oil	14.9	0.843	36.4	below 50
Non-viscous lub. dist.	9.8	0.865-0.886	32.1-28.2	50-100
Medium lub. dist.	5.9	0.886-0.900	28.2-25.7	100-200
Viscous lub. dist.	3.4	0.900-0.908	25.7-24.3	above 200
Residuum	24.9	0.986	12.0	
Distillation loss	1.6			

[1]Correlation Index
[2]Characterization Factor

Lab. No. O-280

Oil from: Bethel formation
Chester (Upper Miss.) series
Depth 2017 feet

Jefferson County
Sec. 25, T. 2 S., R. 1 E.
Woodlawn field

General Characteristics

Specific gravity: 0.836
Sulfur, per cent: 0.16
Saybolt Universal Viscosity (100°F): 42.0

A.P.I. Gravity: 37.8°
Color: Brown

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure — Barometer Reading 738.6 First drop, 91°F

Fraction No.	Cut at °C	Cut at °F	Per cent cut	Sum per cent	Sp. gr. 60/60°F	°A.P.I. 60°F	S.U. visc. 100°F	Cloud Test °F	C.I.[1]	K[2]
1	50	122	2.5	2.5	0.668	80.3	—	—		
2	75	167	4.4	6.9	0.694	72.4	—	—	19	12.12
3	100	212	5.4	12.3	0.743	59.0	—	—	32	11.63
4	125	257	6.4	18.7	0.757	55.4	—	—	30	11.66
5	150	302	5.8	24.5	0.767	53.0	—	—	27	11.74
6	175	347	5.5	30.0	0.777	50.6	—	—	25	11.83
7	200	392	5.0	35.0	0.790	47.6	—	—	25	11.87
8	225	437	4.5	39.5	0.805	44.3	—	—	26	11.80
9	250	482	4.9	44.4	0.820	41.1	—	—	28	11.81
10	275	527	5.6	50.0	0.837	37.6	—	—	32	11.75
Vacuum distillation at 40 mm.										
11	200	392	3.7	53.7	0.845	36.0	39	5	31	11.82
12	225	437	4.6	58.3	0.858	33.4	44	30	34	11.80
13	250	482	4.8	63.1	0.868	31.5	55	50	35	11.82
14	275	527	4.9	68.0	0.873	30.6	80	65	38	11.83
15	300	572	5.7	73.7	0.887	28.0	130	85	42	11.80

Carbon residue of residuum, 10.1% — Carbon residue or crude, 2.8%

APPROXIMATE SUMMARY

	Per cent	Sp. gr.	°A.P.I.	Viscosity
Light gasoline	12.3	0.710	67.8	
Gasoline and naphtha	35.0	0.750	57.2	
Kerosene	9.4	0.813	42.6	
Gas oil	14.1	0.846	35.8	below 50
Non-viscous lub. dist.	9.2	0.863-0.878	32.5-29.7	50-100
Medium lub. dist.	6.0	0.878-0.894	29.7-26.8	100-200
Viscous lub. dist.	0.0			
Residuum	23.6	0.959	16.1	
Distillation loss	2.7			

[1]Correlation Index
[2]Characterization Factor

Lab. No. O-281

Oil from: McClosky "lime"
Iowa (Lower Miss.) series
Depth 3129 feet

Richland County
Sec. 34, T. 3 N., R. 14 W.
Bonpas field

General Characteristics

Specific gravity: 0.844
Sulfur, per cent: 0.23
Saybolt Universal Viscosity (100°F): 46.0

A.P.I. Gravity: 36.2°
Color: Dark Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure — Barometer Reading 740.8 First drop, 89°F

Fraction No.	Cut at °C	Cut at °F	Per cent cut	Sum per cent	Sp. gr. 60/60°F	°A.P.I. 60°F	S.U. visc. 100°F	Cloud Test °F	C.I.[1]	K[2]
1	50	122	2.6	2.6	0.649	86.5	—	—		
2	75	167	3.4	6.0	0.689	73.9	—	—	17	12.20
3	100	212	5.5	11.5	0.729	62.6	—	—	26	11.84
4	125	257	5.9	17.4	0.752	56.7	—	—	27	11.73
5	150	302	4.5	21.9	0.770	52.3	—	—	28	11.69
6	175	347	4.6	26.5	0.788	48.1	—	—	30	11.67
7	200	392	4.4	30.9	0.808	43.6	—	—	33	11.58
8	225	437	4.1	35.0	0.820	41.1	—	—	33	11.58
9	250	482	4.8	39.8	0.829	39.2	—	—	32	11.70
10	275	527	6.5	46.3	0.838	37.4	—	—	32	11.74
Vacuum distillation at 40 mm.										
11	200	392	3.6	49.9	0.845	36.0	39	5	31	11.82
12	225	437	3.9	53.8	0.855	34.0	45	30	32	11.84
13	250	482	5.4	59.2	0.865	32.1	57	50	34	11.86
14	275	527	5.7	64.9	0.877	29.8	85	65	40	11.79
15	300	572	6.3	71.2	0.887	28.0	160	85	42	11.80

Carbon residue of residuum, 4.6% — Carbon residue or crude, 1.4%

APPROXIMATE SUMMARY

	Per cent	Sp. gr.	°A.P.I.	Viscosity
Light gasoline	11.5	0.699	70.9	
Gasoline and naphtha	30.9	0.748	57.7	
Kerosene	4.1	0.820	41.1	
Gas oil	18.8	0.841	36.8	below 50
Non-viscous lub. dist.	9.5	0.859-0.879	33.2-29.5	50-100
Medium lub. dist.	7.9	0.879-0.892	29.5-27.1	100-200
Viscous lub. dist.	0.0			
Residuum	26.8	0.937	19.5	
Distillation loss	2.0			

[1]Correlation Index
[2]Characterization Factor

Lab. No. O-282

Oil from: Aux Vases formation
Chester (Upper Miss.) series
Depth 1735 feet

Shelby County
Sec. 12, T. 10 N., R. 2 E.
Lakewood field

General Characteristics

Specific gravity: 0.867
Sulfur, per cent: 0.23
Saybolt Universal Viscosity (100°F): 65.0

A.P.I. Gravity: 31.7°
Color: Brown

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure — Barometer Reading 744.2 First drop, 210°F

Fraction No.	Cut at °C	Cut at °F	Per cent cut	Sum per cent	Sp. gr. 60/60°F	°A.P.I. 60°F	S.U. visc. 100°F	Cloud Test °F	C.I.[1]	K[2]
1	50	122								
2	75	167								
3	100	212								
4	125	257	2.6	2.6	0.730	62.3	—	—	17	12.98
5	150	302	5.9	8.5	0.753	56.4	—	—	20	11.95
6	175	347	5.5	14.0	0.770	52.3	—	—	22	11.04
7	200	392	5.0	19.0	0.788	48.1	—	—	24	11.90
8	225	437	4.8	23.8	0.803	44.7	—	—	25	11.83
9	250	482	6.0	29.8	0.815	42.1	—	—	26	11.87
10	275	527	7.2	37.0	0.835	38.0	—	—	31	11.78
Vacuum distillation at 40 mm.										
11	200	392	5.6	42.6	0.844	36.2	40	15	31	11.83
12	225	437	6.6	49.2	0.855	34.0	45	35	32	11.84
13	250	482	6.0	55.2	0.865	32.1	58	60	34	11.86
14	275	527	5.8	61.0	0.873	30.6	80	80	38	11.83
15	300	572	7.3	68.3	0.887	28.0	140	95	42	11.80

Carbon residue of residuum, 10.5% — Carbon residue of crude, 3.7%

AGPROXIMATE SUMMARY

	Per cent	Sp. gr.	°A.P.I.	Viscosity
Light gasoline	0.0			
Gasoline and naphtha	19.0	0.764	53.7	
Kerosene	10.8	0.810	43.2	
Gas oil	18.6	0.844	36.2	below 50
Non-viscous lub. dist.	11.9	0.859-0.878	33.2-29.7	50-100
Medium lub. dist.	8.0	0.878-0.895	29.7-26.6	100-200
Viscous lub. dist.	0.0			
Residuum	31.6	0.958	16.2	
Distillation loss	0.1			

[1]Correlation Index
[2]Characterization Factor

Lab. No. O-285

Oil from: Bethel formation
Chester (Upper Miss.) series
Depth 2028 feet

Jackson County
Sec. 22, T. 7 S., R. 1 W.
Elkville field

General Characteristics

Specific gravity: 0.846
Sulfur, per cent: 0.22
Saybolt Universal Viscosity (100°F): 49.0

A.P.I. Gravity: 35.8°
Color: Brown

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure — Barometer Reading 747.6 First drop, 89°F

Fraction No.	Cut at °C	Cut at °F	Per cent cut	Sum per cent	Sp. gr. 60/60°F	°A.P.I. 60°F	S.U. visc. 100°F	Cloud Test °F	C.I.[1]	K[2]
1	50	122	1.8	1.8	0.639	89.9	—	—		
2	75	167	3.1	4.9	0.665	81.3	—	—	5.1	12.72
3	100	212	2.9	7.8	0.694	72.4	—	—	8.9	12.46
4	125	257	5.1	12.9	0.725	63.7	—	—	15	12.17
5	150	302	5.4	18.3	0.743	59.0	—	—	16	12.11
6	175	347	5.1	23.4	0.763	54.0	—	—	18	12.05
7	200	392	4.6	28.0	0.780	49.9	—	—	20	12.01
8	225	437	4.4	32.4	0.795	46.5	—	—	22	11.97
9	250	482	5.0	37.4	0.810	43.2	—	—	23	11.94
10	275	527	6.6	44.0	0.825	40.0	—	—	26	11.91
Vacuum distillation at 40 mm.										
11	200	392	4.7	48.7	0.835	38.0	40	5	27	11.96
12	225	437	5.3	54.0	0.848	35.4	45	30	29	11.94
13	250	482	4.9	58.9	0.860	33.0	58	55	31	11.92
14	275	527	5.1	64.0	0.866	31.9	85	70	31	12.02
15	300	572	5.7	69.7	0.880	29.3	140	85	35	12.00

Carbon residue of residuum, 6.8% — Carbon residue or crude, 2.2%

APPROXIMATE SUMMARY

	Per cent	Sp. gr.	°A.P.I.	Viscosity
Light gasoline	7.8	0.670	79.7	
Gasoline and naphtha	28.0	0.729	62.6	
Kerosene	16.0	0.812	42.8	
Gas oil	9.4	0.841	36.8	below 50
Non-viscous lub. dist.	9.5	0.853-0.870	34.4-31.1	50-100
Medium lub. dist.	6.8	0.870-0.887	31.1-28.0	100-200
Viscous lub. dist.	0.0			
Residuum	28.2	0.965	15.1	
Distillation loss	2.1			

[1]Correlation Index
[2]Characterization Factor

Lab. No. O-286

Oil from: Devonian limestone
Devonian system
Depth 2684 feet

Clinton County
Sec. 35, T. 3 N., R. 2 W.
Boulder field

General Characteristics

Specific gravity: 0.893
Sulfur, per cent: 0.34
Saybolt Universal Viscosity (100°F): 91.0

A.P.I. Gravity: 27.0°
Color: Brown

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure — Barometer Reading 745.9 First drop, 195°F

Fraction No.	Cut at °C	Cut at °F	Per cent cut	Sum per cent	Sp. gr. 60/60°F	°A.P.I. 60°F	S.U. visc. 100°F	Cloud Test °F	C.I.[1]	K[2]
1	50	122								
2	75	167								
3	100	212								
4	125	257	3.6	3.6	0.779	50.2	—	—	40	11.32
5	150	302	3.9	7.5	0.789	47.8	—	—	37	11.41
6	175	347	3.6	11.1	0.805	44.3	—	—	38	11.40
7	200	392	4.1	15.2	0.820	41.1	—	—	39	11.42
8	225	437	4.5	19.7	0.833	38.4	—	—	40	11.41
9	250	482	5.1	24.8	0.845	36.0	—	—	40	11.48
10	275	527	7.1	31.9	0.858	33.4	—	—	41	11.47
Vacuum distillation at 40 mm.										
11	200	392	5.6	37.5	0.865	32.1	40	5	41	11.55
12	225	437	6.0	43.5	0.875	30.2	48	30	42	11.58
13	250	482	5.8	49.3	0.885	28.4	65	50	43	11.61
14	275	527	5.8	55.1	0.892	27.1	100	70	43	11.67
15	300	572	7.7	62.8	0.907	24.5	200	90	47	11.63

Carbon residue of residuum, 5.9% — Carbon residue of crude, 2.3%

APPROXIMATE SUMMARY

	Per cent	Sp. gr.	°A.P.I.	Viscosity
Light gasoline	0.0			
Gasoline and naphtha	15.2	0.799	45.6	
Kerosene	0.0			
Gas oil	26.0	0.855	34.0	below 50
Non-viscous lub. dist.	11.0	0.876-0.892	30.0-27.1	50-100
Medium lub. dist.	6.8	0.892-0.907	27.1-24.5	100-200
Viscous lub. dist.	3.8	0.907-0.915	24.5-23.2	above 200
Residuum	37.1	0.945	18.2	
Distillation loss	0.1			

[1]Correlation Index
[2]Characterization Factor

Lab. No. O-287

Oil from: Bethel formation
Chester (Upper Miss.) series
Depth 1991 feet

Jefferson County
Sec. 35, T. 2 S., R. 1 E.
Woodlawn field

General Characteristics

Specific gravity: 0.834
Sulfur, per cent: 0.16
Saybolt Universal Viscosity (100°F): 41.0

A.P.I. Gravity: 38.2°
Color: Dark Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure — Barometer Reading 747.1 First drop, 87°F

Fraction No.	Cut at °C	Cut at °F	Per cent cut	Sum per cent	Sp. gr. 60/60°F	°A.P.I. 60°F	S.U. visc. 100°F	Cloud Test °F	C.I.[1]	K[2]
1	50	122	3.0	3.0	0.648	86.9	—	—		
2	75	167	3.1	6.1	0.664	81.6	—	—	4.6	12.75
3	100	212	4.9	11.0	0.712	67.2	—	—	18	12.14
4	125	257	6.5	17.5	0.737	60.5	—	—	20	11.96
5	150	302	5.9	23.4	0.752	56.7	—	—	20	11.97
6	175	347	5.4	28.8	0.768	52.8	—	—	21	11.97
7	200	392	5.0	33.8	0.785	48.8	—	—	23	11.94
8	225	437	5.0	38.8	0.798	45.8	—	—	23	11.92
9	250	482	4.8	43.6	0.813	42.6	—	—	25	11.90
10	275	527	6.2	49.8	0.833	38.4	—	—	30	11.81
Vacuum distillation at 40 mm.										
11	200	392	4.7	54.5	0.843	36.4	39	5	30	11.84
12	225	437	5.1	59.6	0.853	34.4	46	25	31	11.87
13	250	482	5.4	65.0	0.865	32.1	61	50	34	11.85
14	275	527	5.1	70.1	0.871	31.0	95	65	33	11.96
15	300	572	5.4	75.5	0.885	28.4	150	85	37	11.93

Carbon residue of residuum, 9.0% — Carbon residue of crude, 2.5%

APPROXIMATE SUMMARY

	Per cent	Sp. gr.	°A.P.I.	Viscosity
Light gasoline	11.0	0.681	76.3	
Gasoline and naphtha	33.8	0.733	61.6	
Kerosene	9.8	0.805	44.3	
Gas oil	14.9	0.841	36.8	below 50
Non-viscous lub. dist.	9.5	0.856-0.872	33.8-30.8	50-100
Medium lub. dist.	7.5	0.872-0.892	30.8-27.1	100-200
Viscous lub. dist.	0.0			
Residuum	23.4	0.957	16.4	
Distillation loss	0.6			

[1]Correlation Index
[2]Characterization Factor

Lab. No. O-288

Oil from: McClosky "lime"
Iowa (Lower Miss.) series
Depth 3380 feet

Wayne County
Sec. 8, T. 3 S., R. 6 E.
Mayberry field

General Characteristics

Specific gravity: 0.835
Sulfur, per cent: 0.16
Saybolt Universal Viscosity (100°F): 43.0

A.P.I. Gravity: 38.0°
Color: Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure — Barometer Reading 746.8 First drop, 91°F

Fraction No.	Cut at °C	Cut at °F	Per cent cut	Sum per cent	Sp. gr. 60/60°F	°A.P.I. 60°F	S.U. visc. 100°F	Cloud Test °F	C.I.[1]	K[2]
1	50	122	2.7	2.7	0.645	87.9	—	—		
2	75	167	3.0	5.7	0.668	80.3	—	—	6.5	12.65
3	100	212	4.9	10.6	0.710	67.8	—	—	17	12.17
4	125	257	6.4	17.0	0.738	60.2	—	—	21	11.94
5	150	302	6.0	23.0	0.755	55.9	—	—	21	11.91
6	175	347	5.6	28.6	0.773	51.6	—	—	23	11.90
7	200	392	5.0	33.6	0.790	47.6	—	—	25	11.87
8	225	437	4.8	38.4	0.803	44.7	—	—	25	11.83
9	250	482	4.8	43.2	0.815	42.1	—	—	26	11.87
10	275	527	5.7	48.9	0.830	39.0	—	—	28	11.84
Vacuum distillation at 40 mm.										
11	200	392	4.7	53.6	0.838	37.4	38	5	28	11.92
12	225	437	4.6	58.2	0.848	35.4	44	30	29	11.94
13	250	482	4.6	62.8	0.863	32.5	58	50	33	11.88
14	275	527	4.5	67.3	0.871	31.0	90	70	33	11.96
15	300	572	5.7	73.0	0.882	28.9	140	90	36	11.97

Carbon residue of residuum, 6.2% — Carbon residue of crude, 1.9%

APPROXIMATE SUMMARY

	Per cent	Sp. gr.	°A.P.I.	Viscosity
Light gasoline	10.6	0.682	76.0	
Gasoline and naphtha	33.6	0.737	60.5	
Kerosene	9.6	0.809	43.4	
Gas oil	14.8	0.838	37.4	below 50
Non-viscous lub. dist.	8.1	0.855-0.873	34.0-30.6	50-100
Medium lub. dist.	6.9	0.873-0.888	30.6-27.9	100-200
Viscous lub. dist.	0.0			
Residuum	26.1	0.942	18.7	
Distillation loss	0.9			

[1]Correlation Index
[2]Characterization Factor

Lab. No. O-289

Oil from: McClosky "lime"
Iowa (Lower Miss.) series
Depth 3215 feet

Wayne County
Sec. 33, T. 1 N., R. 6 E.
Johnsonville field

General Characteristics

Specific gravity: 0.835
Sulfur, per cent: 0.17
Saybolt Universal Viscosity (100°F): 42.0

A.P.I. Gravity: 38.0°
Color: Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure — Barometer Reading 745.8 First drop, 89°F

Fraction No.	Cut at °C	Cut at °F	Per cent cut	Sum per cent	Sp. gr. 60/60°F	°A.P.I. 60°F	S.U. visc. 100°F	Cloud Test °F	C.I.[1]	K[2]
1	50	122	2.3	2.3	0.647	87.2	—	—		
2	75	167	3.0	5.3	0.667	80.6	—	—	6.1	12.68
3	100	212	5.5	10.8	0.712	67.2	—	—	18	12.14
4	125	257	6.8	17.6	0.740	59.7	—	—	22	11.91
5	150	302	5.9	23.5	0.755	55.9	—	—	21	11.91
6	175	347	5.3	28.8	0.773	51.6	—	—	23	11.90
7	200	392	5.0	33.8	0.790	47.6	—	—	25	11.87
8	225	437	4.6	38.4	0.805	44.3	—	—	26	11.80
9	250	482	5.1	43.5	0.818	41.5	—	—	27	11.83
10	275	527	5.7	49.2	0.833	38.4	—	—	30	11.81
Vacuum distillation at 40 mm.										
11	200	392	4.5	53.7	0.840	37.0	38	5	29	11.89
12	225	437	5.2	58.9	0.850	35.0	44	25	30	11.91
13	250	482	5.5	64.4	0.863	32.5	57	50	33	11.88
14	275	527	5.4	69.8	0.871	31.0	90	70	33	11.96
15	300	572	5.8	75.6	0.887	28.0	140	90	38	11.90

Carbon residue of residuum, 6.1% — Carbon residue of crude, 1.7%

APPROXIMATE SUMMARY

	Per cent	Sp. gr.	°A.P.I.	Viscosity
Light gasoline	10.8	0.686	74.8	
Gasoline and naphtha	33.8	0.738	60.2	
Kerosene	9.7	0.812	42.8	
Gas oil	15.3	0.841	36.8	below 50
Non-viscous lub. dist.	9.4	0.856-0.874	33.8-30.4	50-100
Medium lub. dist.	7.4	0.874-0.895	30.4-26.6	100-200
Viscous lub. dist.	0.0			
Residuum	23.7	0.948	17.8	
Distillation loss	0.7			

[1]Correlation Index
[2]Characterization Factor

Lab. No. O-290

Oil from: McClosky "lime"
Iowa (Lower Miss.) series
Depth 3129 feet

Richland County
Sec. 29, T. 2 N., R. 14 W.
Parkersburg field

General Characteristics

Specific gravity: 0.835
Sulfur, per cent: 0.31
Saybolt Universal Viscosity (100°F): 43.0

A.P.I. Gravity: 38.0°
Color: Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure — Barometer Reading 744.5 First drop, 91°F

Fraction No.	Cut at °C	Cut at °F	Per cent cut	Sum per cent	Sp. gr. 60/60°F	°A.P.I. 60°F	S.U. visc. 100°F	Cloud Test °F	C.I.[1]	K[2]
1	50	122	2.1	2.1	0.632	92.4	—	—		
2	75	167	4.1	6.2	0.669	80.0	—	—	7.0	12.63
3	100	212	4.9	11.1	0.712	67.2	—	—	18	12.14
4	125	257	6.4	17.5	0.735	61.0	—	—	19	11.99
5	150	302	5.8	23.3	0.754	56.2	—	—	21	11.93
6	175	347	5.2	28.5	0.773	51.6	—	—	23	11.90
7	200	392	4.4	32.9	0.792	47.2	—	—	26	11.84
8	225	437	4.6	37.5	0.807	43.8	—	—	27	11.77
9	250	482	5.1	42.6	0.820	41.1	—	—	28	11.81
10	275	527	5.4	48.0	0.833	38.4	—	—	30	11.81
Vacuum distillation at 40 mm.										
11	200	392	4.4	52.4	0.843	36.4	39	5	30	11.84
12	225	437	4.6	57.0	0.855	34.0	46	30	32	11.84
13	250	482	4.4	61.4	0.868	31.5	58	50	35	11.82
14	275	527	4.7	66.1	0.876	30.0	85	65	36	11.88
15	300	572	5.7	71.8	0.890	27.5	160	85	39	11.86

Carbon residue of residuum, 4.2% — Carbon residue of crude, 1.3%

APPROXIMATE SUMMARY

	Per cent	Sp. gr.	°A.P.I.	Viscosity
Light gasoline	11.1	0.681	76.3	
Gasoline and naphtha	32.9	0.734	61.3	
Kerosene	9.7	0.814	42.3	
Gas oil	13.6	0.842	36.6	below 50
Non-viscous lub. dist.	8.7	0.859-0.879	33.2-29.5	50-100
Medium lub. dist.	6.8	0.879-0.897	29.5-26.3	100-200
Viscous lub. dist.	0.1	0.897-0.897	26.3-26.3	above 200
Residuum	27.3	0.930	20.7	
Distillation loss	0.9			

[1]Correlation Index
[2]Characterization Factor

Lab. No. O-291

Oil from: Devonian limestone
Devonian system
Depth 2965 feet

Crawford County
Sec. 9, T. 6 N., R. 13 W.
Crawford Main field

General Characteristics

Specific gravity: 0.840
Sulfur, per cent: 0.43
Saybolt Universal Viscosity (100°F): 44.0

A.P.I. Gravity: 37.0°
Color: Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure — Barometer Reading 743.0 First drop, 86°F

Fraction No.	Cut at °C	Cut at °F	Per cent cut	Sum per cent	Sp. gr. 60/60°F	°A.P.I. 60°F	S.U. visc. 100°F	Cloud Test °F	C.I.[1]	K[2]
1	50	122	3.3	3.3	0.645	87.9	—	—		
2	75	167	2.9	6.2	0.667	80.6	—	—	6.1	12.68
3	100	212	5.2	11.4	0.710	67.8	—	—	17	12.17
4	125	257	6.1	17.5	0.738	60.2	—	—	21	11.94
5	150	302	5.3	22.8	0.763	54.0	—	—	25	11.80
6	175	347	5.1	27.9	0.783	49.2	—	—	28	11.75
7	200	392	4.5	32.4	0.803	44.7	—	—	31	11.65
8	225	437	4.1	36.5	0.815	42.1	—	—	31	11.66
9	250	482	4.9	41.4	0.828	39.4	—	—	32	11.71
10	275	527	5.4	46.8	0.840	37.0	—	—	33	11.71
Vacuum distillation at 40 mm.										
11	200	392	3.7	50.5	0.850	35.0	39	5	34	11.75
12	225	437	4.4	54.9	0.860	33.0	44	30	35	11.77
13	250	482	4.9	59.8	0.870	31.1	57	50	36	11.79
14	275	527	4.9	64.7	0.878	29.7	90	70	37	11.86
15	300	572	5.3	70.0	0.890	27.5	150	85	39	11.86

Carbon residue of residuum, 5.4% — Carbon residue of crude, 1.8%

APPROXIMATE SUMMARY

	Per cent	Sp. gr.	°A.P.I.	Viscosity
Light gasoline	11.4	0.680	76.6	
Gasoline and naphtha	32.4	0.738	60.2	
Kerosene	4.1	0.815	42.1	
Gas oil	18.4	0.844	36.2	below 50
Non-viscous lub. dist.	8.2	0.865-0.880	32.1-29.3	50-100
Medium lub. dist.	6.9	0.880-0.896	29.3-26.4	100-200
Viscous lub. dist.	0.0			
Residuum	29.0	0.948	17.8	
Distillation loss	1.0			

[1]Correlation Index
[2]Characterization Factor

Lab. No. O-292

Oil from: Aux Vases formation
Chester (Upper Miss.) series
Depth 2790 feet

Clay County
Sec. 4, T. 2 N., R. 5 E.
Xenia field

General Characteristics

Specific gravity: 0.849
Sulfur, per cent: 0.19
Saybolt Universal Viscosity (100°F): 49.0

A.P.I. Gravity: 35.2°
Color: Brown

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure — Barometer Reading 745.2 First drop, 87°F

Fraction No.	Cut at °C	Cut at °F	Per cent cut	Sum per cent	Sp. gr. 60/60°F	°A.P.I. 60°F	S.U. visc. 100°F	Cloud Test °F	C.I.[1]	K[2]
1	50	122	2.2	2.2	0.649	86.5	—	—		
2	75	167	3.8	6.0	0.669	80.0	—	—	7.0	12.63
3	100	212	4.0	10.0	0.707	68.6	—	—	15	12.22
4	125	257	6.2	16.2	0.729	62.6	—	—	17	12.10
5	150	302	5.4	21.6	0.749	57.4	—	—	18	12.02
6	175	347	5.0	26.6	0.770	52.3	—	—	22	11.94
7	200	392	4.4	31.0	0.788	48.1	—	—	24	11.90
8	225	437	4.5	35.5	0.803	44.7	—	—	25	11.83
9	250	482	4.8	40.3	0.815	42.1	—	—	26	11.87
10	275	527	5.4	45.7	0.828	39.4	—	—	27	11.87
Vacuum distillation at 40 mm.										
11	200	392	3.7	49.4	0.840	37.0	40	5	29	11.89
12	225	437	5.2	54.6	0.853	34.4	45	25	31	11.87
13	250	482	5.0	59.6	0.865	32.1	59	50	34	11.85
14	275	527	5.2	64.8	0.871	31.0	95	65	33	11.96
15	300	572	5.8	70.6	0.885	28.4	160	85	37	11.93

Carbon residue of residuum, 9.8% — Carbon residue of crude, 3.2%

APPROXIMATE SUMMARY

	Per cent	Sp. gr.	°A.P.I.	Viscosity
Light gasoline	10.0	0.680	76.6	
Gasoline and naphtha	31.0	0.732	61.8	
Kerosene	9.3	0.809	43.4	
Gas oil	13.5	0.839	37.2	below 50
Non-viscous lub. dist.	8.8	0.857-0.872	33.6-30.8	50-100
Medium lub. dist.	8.0	0.872-0.892	30.8-27.1	100-200
Viscous lub. dist.	0.0			
Residuum	28.2	0.972	14.1	
Distillation loss	1.2			

[1]Correlation Index
[2]Characterization Factor

Lab. No. O-293

Oil from: Pennsylvania sand
Pennsylvanian system
Depth 474 feet

Macoupin County
Sec. 20, T. 10 N., R. 7 W.
Carlinville North field

General Characteristics

Specific gravity: 0.932
Sulfur, per cent: 0.35
Saybolt Universal Viscosity (100°F): 544

A.P.I. Gravity: 20.3°
Color: Brown

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure — Barometer Reading 744.6 First drop, 335°F

Fraction No.	Cut at °C	Cut at °F	Per cent cut	Sum per cent	Sp. gr. 60/60°F	°A.P.I. 60°F	S.U. visc. 100°F	Cloud Test °F	C.I.[1]	K[2]
1	50	122								
2	75	167								
3	100	212								
4	125	257								
5	150	302								
6	175	347								
7	200	392	1.9	1.9	0.817	41.7	—	—	38	11.45
8	225	437	2.4	4.3	0.829	39.2	—	—	38	11.45
9	250	482	3.8	8.1	0.849	35.2	—	—	42	11.42
10	275	527	5.9	14.0	0.862	32.7	—	—	43	11.41
Vacuum distillation at 40 mm.										
11	200	392	5.4	19.4	0.872	30.8	42	—	44	11.46
12	225	437	6.4	25.8	0.883	28.8	48	—	46	11.48
13	250	482	6.9	32.7	0.898	26.1	70	—	49	11.45
14	275	527	6.6	39.3	0.910	24.0	125	—	52	11.44
15	300	572	9.5	48.8	0.923	21.8	230	[3]	55	11.43

Carbon residue of residuum, 9.1% — Carbon residue of crude, 4.9%

APPROXIMATE SUMMARY

	Per cent	Sp. gr.	°A.P.I.	Viscosity
Light gasoline	0.0			
Gasoline and naphtha	1.9	0.817	41.7	
Kerosene	0.0	—	—	
Gas oil	24.4	0.865	32.1	below 50
Non-viscous lub. dist.	6.6	0.891-0.904	27.3-25.0	50-100
Medium lub. dist.	8.9	0.904-0.919	25.0-22.5	100-200
Viscous lub. dist.	7.0	0.919-0.930	22.5-20.7	above 200
Residuum	51.2	0.969	14.5	
Distillation loss	0.0			

[1]Correlation Index
[2]Characterization Factor
[3]Pour point below 5°F—no wax

Lab. No. O-294

Oil from: McClosky "lime"
Iowa (Lower Miss.) series
Depth 3033 feet

Richland County
Sec. 6, T. 4 N., R. 14 W.
Springtown field

General Characteristics

Specific gravity: 0.826
Sulfur, per cent: 0.24
Saybolt Universal Viscosity (100°F): 40.0

A.P.I. Gravity: 39.8°
Color: Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure — Barometer Reading 743.7 First drop, 82°F

Fraction No.	Cut at °C	Cut at °F	Per cent cut	Sum per cent	Sp. gr. 60/60°F	°A.P.I. 60°F	S.U. visc. 100°F	Cloud Test °F	C.I.[1]	K[2]
1	50	122	3.3	3.3	0.647	87.2	—	—		
2	75	167	3.2	6.5	0.667	80.6	—	—	6.1	12.68
3	100	212	5.5	12.0	0.718	65.6	—	—	20	12.04
4	125	257	6.4	18.4	0.740	59.7	—	—	22	11.91
5	150	302	5.7	24.1	0.755	55.9	—	—	21	11.91
6	175	347	5.6	29.7	0.770	52.3	—	—	22	11.94
7	200	392	4.8	34.5	0.788	48.1	—	—	24	11.90
8	225	437	4.6	39.1	0.803	44.7	—	—	25	11.83
9	250	482	4.9	44.0	0.818	41.5	—	—	27	11.83
10	275	527	6.3	50.3	0.832	38.6	—	—	29	11.82
Vacuum distillation at 40 mm.										
11	200	392	4.0	54.3	0.843	36.4	40	10	30	11.84
12	225	437	4.6	58.9	0.855	34.0	46	30	32	11.84
13	250	482	4.5	63.4	0.865	32.1	59	50	34	11.85
14	275	527	4.5	67.9	0.873	30.6	90	65	34	11.93
15	300	572	5.4	73.3	0.885	28.4	150	80	37	11.93

Carbon residue of residuum, 5.2% — Carbon residue of crude, 1.4%

APPROXIMATE SUMMARY

	Per cent	Sp. gr.	°A.P.I.	Viscosity
Light gasoline	12.0	0.685	75.1	
Gasoline and naphtha	34.5	0.735	61.0	
Kerosene	9.5	0.811	42.9	
Gas oil	14.0	0.841	36.8	below 50
Non-viscous lub. dist.	8.4	0.858-0.875	33.4-30.2	50-100
Medium lub. dist.	6.9	0.875-0.892	30.2-27.1	100-200
Viscous lub. dist.	0.0			
Residuum	22.9	0.935	19.8	
Distillation loss	3.8			

[1]Correlation Index
[2]Characterization Factor

Lab. No. O-295

Oil from: Aux Vases formation
Chester (Upper Miss.) series
Depth 1842 feet

Coles County
Sec. 2, T. 13 N., R. 7 E.
Cook's Mills field

General Characteristics

Specific gravity: 0.843
Sulfur, per cent: 0.40
Saybolt Universal Viscosity (100°F): 45.0

A.P.I. Gravity: 36.4°
Color: Brown

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure — Barometer Reading 746.6 First drop, 98°F

Fraction No.	Cut at °C	Cut at °F	Per cent cut	Sum per cent	Sp. gr. 60/60°F	°A.P.I. 60°F	S.U. visc. 100°F	Cloud Test °F	C.I.[1]	K[2]
1	50	122	2.2	2.2						
2	75	167	2.4	4.6	0.663	81.9	—	—	4.2	12.77
3	100	212	4.8	9.4	0.718	65.6	—	—	20	12.04
4	125	257	5.8	15.2	0.738	60.2	—	—	21	11.94
5	150	302	5.0	20.2	0.758	55.2	—	—	23	11.87
6	175	347	5.2	25.4	0.770	52.3	—	—	22	11.94
7	200	392	4.6	30.0	0.789	47.8	—	—	24	11.88
8	225	437	4.8	34.8	0.803	44.7	—	—	25	11.83
9	250	482	4.7	39.5	0.815	42.1	—	—	26	11.87
10	275	527	6.4	45.9	0.830	39.0	—	—	28	11.84
Vacuum distillation at 40 mm.										
11	200	392	4.4	50.3	0.843	36.4	39	below 5	30	11.84
12	225	437	4.6	54.9	0.853	34.4	44	25	31	11.87
13	250	482	5.3	60.2	0.863	32.5	56	50	33	11.88
14	275	527	5.6	65.8	0.871	31.0	85	70	33	11.96
15	300	572	6.8	72.6	0.882	28.9	150	80	36	11.97

Carbon residue of residuum, 7.9% — Carbon residue of crude, 2.3%

APPROXIMATE SUMMARY

	Per cent	Sp. gr.	°A.P.I.	Viscosity
Light gasoline	9.4	0.691	73.3	
Gasoline and naphtha	30.0	0.740	59.7	
Kerosene	9.5	0.809	43.4	
Gas oil	15.6	0.841	36.8	below 50
Non-viscous lub. dist.	9.3	0.858-0.873	33.4-30.6	50-100
Medium lub. dist.	8.2	0.873-0.888	30.6-27.9	100-200
Viscous lub. dist.	0.0			
Residuum	25.8	0.951	17.3	
Distillation loss	1.6			

[1]Correlation Index
[2]Characterization Factor

Lab. No. O-296

Oil from: McClosky Fredonia zone
Iowa (Lower Miss.) series
Depth 2935 feet

Jasper County
Sec. 5, T. 5 N., R. 14 W.
Ste. Marie field

General Characteristics

Specific gravity: 0.824
Sulfur, per cent: 0.14
Saybolt Universal Viscosity (100°F): 39.0

A.P.I. Gravity: 40.2°
Color: Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure — Barometer Reading 744.6 First drop, 84°F

Fraction No.	Cut at °C	Cut at °F	Per cent cut	Sum per cent	Sp. gr. 60/60°F	°A.P.I. 60°F	S.U. visc. 100°F	Cloud Test °F	C.I.[1]	K[2]
1	50	122	3.9	3.9	0.645	87.9	—	—		
2	75	167	3.3	7.2	0.663	81.9	—	—	4.2	12.77
3	100	212	5.5	12.7	0.712	67.2	—	—	18	12.14
4	125	257	6.4	19.1	0.737	60.5	—	—	20	11.96
5	150	302	6.0	25.1	0.753	56.4	—	—	20	11.95
6	175	347	5.4	30.5	0.770	52.3	—	—	22	11.94
7	200	392	5.0	35.5	0.788	48.1	—	—	24	11.90
8	225	437	5.0	40.5	0.803	44.7	—	—	25	11.83
9	250	482	4.7	45.2	0.815	42.1	—	—	26	11.87
10	275	527	5.7	50.9	0.830	39.0	—	—	28	11.84
Vacuum distillation at 40 mm.										
11	200	392	4.5	55.4	0.843	36.4	40	10	30	11.84
12	225	437	4.6	60.0	0.853	34.4	46	30	31	11.87
13	250	482	4.4	64.4	0.863	32.5	58	50	33	11.88
14	275	527	4.5	68.9	0.873	30.6	90	65	34	11.93
15	300	572	5.7	74.6	0.885	28.4	160	80	37	11.93

Carbon residue of residuum, 5.8% — Carbon residue of crude, 1.5%

APPROXIMATE SUMMARY

	Per cent	Sp. gr.	°A.P.I.	Viscosity
Light gasoline	12.7	0.679	76.9	
Gasoline and naphtha	35.5	0.731	62.1	
Kerosene	9.7	0.809	43.4	
Gas oil	14.0	0.840	37.0	below 50
Non-viscous lub. dist.	8.2	0.856-0.875	33.8-30.2	50-100
Medium lub. dist.	7.2	0.875-0.892	30.2-27.1	100-200
Viscous lub. dist.	0.0			
Residuum	22.0	0.938	19.4	
Distillation loss	3.4			

[1]Correlation Index
[2]Characterization Factor

Lab. No. O-297

Oil from: Tar Springs formation
Chester (Upper Miss.) series
Depth 2326 feet

Clay County
Sec. 26, T. 4 N., R. 7 E.
Sailor Springs field

General Characteristics

Specific gravity: 0.840
Sulfur, per cent: 0.17
Saybolt Universal Viscosity (100°F): 43.0

A.P.I. Gravity: 37.0°
Color: Brown

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure — Barometer Reading 745.2 First drop, 90°F

Fraction No.	Cut at °C	Cut at °F	Per cent cut	Sum per cent	Sp. gr. 60/60°F	°A.P.I. 60°F	S.U. visc. 100°F	Cloud Test °F	C.I.[1]	K[2]
1	50	122	2.4	2.4	0.650	86.2	—	—		
2	75	167	2.8	5.2	0.668	80.3	—	—	6.5	12.65
3	100	212	5.0	10.2	0.713	67.0	—	—	18	12.13
4	125	257	6.3	16.5	0.738	60.2	—	—	21	11.94
5	150	302	5.2	21.7	0.753	56.4	—	—	20	11.95
6	175	347	4.9	26.6	0.770	52.3	—	—	22	11.94
7	200	392	4.7	31.3	0.785	48.8	—	—	23	11.94
8	225	437	4.8	36.1	0.800	45.4	—	—	24	11.89
9	250	482	4.6	40.7	0.815	42.1	—	—	26	11.87
10	275	527	6.7	47.4	0.833	38.4	—	—	30	11.81
Vacuum distillation at 40 mm.										
11	200	392	3.9	51.3	0.843	36.4	39	below 5	30	11.84
12	225	437	4.6	55.9	0.853	34.4	46	25	31	11.87
13	250	482	4.7	60.6	0.863	32.5	61	50	33	11.88
14	275	527	5.1	65.7	0.873	30.6	95	65	34	11.93
15	300	572	6.4	72.1	0.885	28.4	160	80	37	11.93

Carbon residue of residuum, 7.6% — Carbon residue of crude, 2.2%

APPROXIMATE SUMMARY

	Per cent	Sp. gr.	°A.P.I.	Viscosity
Light gasoline	10.2	0.686	74.8	
Gasoline and naphtha	31.3	0.736	60.8	
Kerosene	9.4	0.807	43.8	
Gas oil	14.1	0.840	37.0	below 50
Non-viscous lub. dist.	8.8	0.856-0.874	33.8-30.4	50-100
Medium lub. dist.	8.5	0.874-0.892	30.4-27.1	100-200
Viscous lub. dist.	0.0			
Residuum	24.7	0.951	17.3	
Distillation loss	3.2			

[1]Correlation Index
[2]Characterization Factor

Lab. No. O-298

Oil from: Tar Springs formation
Chester (Upper Miss.) series
Depth 2081 feet

Gallatin County
Sec. 15, T. 8 S., R. 10 E.
Inman East field

General Characteristics

Specific gravity: 0.852
Sulfur, per cent: 0.24
Saybolt Universal Viscosity (100°F): 46.0

A.P.I. Gravity: 34.6°
Color: Brown

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure — Barometer Reading 745.3 First drop, 88°F

Fraction No.	Cut at °C	Cut at °F	Per cent cut	Sum per cent	Sp. gr 60/60°F	°A.P.I. 60°F	S.U. visc. 100°F	Cloud Test °F	C.I.[1]	K[2]
1	50	122	2.1	2.1						
2	75	167	2.6	4.7	0.664	81.6	—	—	4.6	12.75
3	100	212	5.3	10.0	0.710	67.8	—	—	17	12.17
4	125	257	6.5	16.5	0.735	61.0	—	—	19	11.95
5	150	302	5.7	22.2	0.753	56.4	—	—	20	11.95
6	175	347	4.9	27.1	0.770	52.3	—	—	22	11.94
7	200	392	4.9	32.0	0.788	48.1	—	—	24	11.90
8	225	437	4.9	36.9	0.805	44.3	—	—	26	11.80
9	250	482	5.7	42.6	0.818	41.5	—	—	27	11.83
10	275	527	7.2	49.8	0.835	38.0	—	—	31	11.78
Vacuum distillation at 40 mm.										
11	200	392	3.3	53.1	0.845	36.0	41	10	31	11.82
12	225	437	4.6	57.7	0.858	33.4	45	35	34	11.80
13	250	482	5.0	62.7	0.868	31.5	63	55	35	11.82
14	275	527	5.6	68.3	0.882	28.9	100	65	39	11.82
15	300	572	6.1	74.4	0.897	26.3	180	80	43	11.77

Carbon residue of residuum, 9.9%

Carbon residue of crude, 2.9%

APPROXIMATE SUMMARY

	Per cent	Sp. gr.	°A.P.I.	Viscosity
Light gasoline	10.0	0.688	74.2	
Gasoline and naphtha	32.0	0.737	60.5	
Kerosene	10.6	0.812	42.8	
Gas oil	14.1	0.843	36.4	below 50
Non-viscous lub. dist.	8.8	0.861-0.882	32.8-28.9	50-100
Medium lub. dist.	7.3	0.882-0.900	28.9-25.7	100-200
Viscous lub. dist.	1.6	0.900-0.905	25.7-24.9	above 200
Residuum	24.9	0.970	14.4	
Distillation loss	0.7			

[1]Correlation Index
[2]Characterization Factor

Lab. No. O-299

Oil from: Cypress formation
Chester (Upper Miss.) series
Depth 2447 feet

Gallatin County
Sec. 15, T. 8 S., R. 10 E.
Inman East field

General Characteristics

Specific gravity: 0.849
Sulfur, per cent: 0.23
Saybolt Universal Viscosity (100°F): 44.0

A.P.I. Gravity: 35.2°
Color: Brown

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure — Barometer Reading 746.0 First drop, 91°F

Fraction No.	Cut at °C	Cut at °F	Per cent cut	Sum per cent	Sp. gr. 60/60°F	°A.P.I. 60°F	S.U. visc. 100°F	Cloud Test °F	C.I.[1]	K[2]
1	50	122	0.7	0.7						
2	75	167	1.8	2.5	0.698	71.2	—	—	21	12.04
3	100	212	4.6	7.1	0.710	67.8	—	—	17	12.17
4	125	257	7.0	14.1	0.735	61.0	—	—	19	11.99
5	150	302	6.0	20.1	0.753	56.4	—	—	20	11.95
6	175	347	5.7	25.8	0.770	52.3	—	—	22	11.94
7	200	392	5.0	30.8	0.788	48.1	—	—	24	11.90
8	225	437	5.1	35.9	0.805	44.3	—	—	26	11.80
9	250	482	5.2	41.1	0.820	41.1	—	—	28	11.81
10	275	527	6.8	47.9	0.833	38.4	—	—	30	11.81
Vacuum distillation at 40 mm.										
11	200	392	4.8	52.7	0.843	36.4	40	5	30	11.84
12	225	437	4.9	57.6	0.853	34.4	46	25	31	11.87
13	250	482	5.2	62.8	0.863	32.5	64	50	33	11.88
14	275	527	7.0	69.8	0.873	30.6	100	70	34	11.93
15	300	572	7.9	77.7	0.892	27.1	210	85	40	11.83

Carbon residue of residuum, 8.6% — Carbon residue of crude, 2.2%

APPROXIMATE SUMMARY

	Per cent	Sp. gr.	°A.P.I.	Viscosity
Light gasoline	7.1	0.706	68.9	
Gasoline and naphtha	30.8	0.747	57.9	
Kerosene	10.3	0.813	42.6	
Gas oil	15.2	0.841	36.8	below 50
Non-viscous lub. dist.	10.0	0.855-0.873	34.0-30.6	50-100
Medium lub. dist.	6.9	0.873-0.891	30.6-27.3	100-200
Viscous lub. dist.	4.5	0.891-0.902	27.3-25.4	above 200
Residuum	21.8	0.961	15.7	
Distillation loss	0.5			

[1]Correlation Index
[2]Characterization Factor

Lab. No. O-300

Oil from: Aux Vases formation
Chester (Upper Miss.) series
Depth 2920 feet

Saline County
Sec. 8, T. 8 S., R. 7 E.
Eldorado field

General Characteristics

Specific gravity: 0.854
Sulfur, per cent: 0.14
Saybolt Universal Viscosity (100°F): 62.0

A.P.I. Gravity: 34.2°
Color: Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure — Barometer Reading 744.2 First drop, 86°F

Fraction No.	Cut at °C	Cut at °F	Per cent cut	Sum per cent	Sp. gr. 60/60°F	°A.P.I. 60°F	S.U. visc. 100°F	Cloud Test °F	C.I.[1]	K[2]
1	50	122	0.8	0.8						
2	75	167	2.8	3.6	0.689	73.9	—	—	17	12.20
3	100	212	3.1	6.7	0.724	64.0	—	—	23	11.93
4	125	257	4.6	11.3	0.744	58.7	—	—	24	11.85
5	150	302	4.0	15.3	0.762	54.2	—	—	25	11.81
6	175	347	4.0	19.3	0.782	49.5	—	—	27	11.76
7	200	392	3.8	23.1	0.798	45.8	—	—	29	11.74
8	225	437	4.7	27.8	0.810	43.2	—	—	29	11.72
9	250	482	5.2	33.0	0.820	41.1	—	—	28	11.81
10	275	527	6.2	39.2	0.833	38.4	—	—	30	11.81
Vacuum distillation at 40 mm.										
11	200	392	4.0	43.2	0.840	37.0	39	below 5	29	11.89
12	225	437	4.2	47.4	0.850	35.0	46	25	30	11.91
13	250	482	4.8	52.2	0.860	33.0	57	45	31	11.92
14	275	527	4.6	56.8	0.870	31.1	80	65	33	11.97
15	300	572	6.9	63.7	0.884	28.5	140	80	37	11.94

Carbon residue of residuum, 2.7% — Carbon residue of crude, 1.0%

APPROXIMATE SUMMARY

	Per cent	Sp. gr.	°A.P.I.	Viscosity
Light gasoline	6.7	0.705	69.2	
Gasoline and naphtha	23.1	0.751	56.9	
Kerosene	9.9	0.815	42.1	
Gas oil	14.0	0.840	37.0	below 50
Non-viscous lub. dist.	9.4	0.854-0.875	34.2-30.2	50-100
Medium lub. dist.	7.3	0.875-0.892	30.2-27.1	100-200
Viscous lub. dist.	0.0			
Residuum	33.7	0.919	22.5	
Distillation loss	2.6			

[1]Correlation Index
[2]Characterization Factor

Lab. No. O-301

Oil from: McClosky "lime"
Iowa (Lower Miss.) series
Depth 3020 feet

Gallatin County
Sec. 2, T. 8 S., R. 9 E.
Inman North field

General Characteristics

Specific gravity: 0.842
Sulfur, per cent: 0.19
Saybolt Universal Viscosity (100°F): 42.0

A.P.I. Gravity: 36.6°
Color: Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure — Barometer Reading 746.4 First drop, 86°F

Fraction No.	Cut at °C	Cut at °F	Per cent cut	Sum per cent	Sp gr 60/60°F	°A.P.I. 60°F	S U visc 100°F	Cloud Test °F	C.I.[1]	K[2]
1	50	122	2.1	2.1	0.655	84.5	—	—		
2	75	167	2.9	5.0	0.672	79.1	—	—	8.4	12.56
3	100	212	4.1	9.1	0.708	68.3	—	—	16	12.20
4	125	257	6.7	15.8	0.734	61.3	—	—	19	12.00
5	150	302	5.8	21.6	0.752	56.7	—	—	20	11.97
6	175	347	5.4	27.0	0.770	52.3	—	—	22	11.94
7	200	392	5.2	32.2	0.788	48.1	—	—	24	11.90
8	225	437	5.0	37.2	0.805	44.3	—	—	26	11.80
9	250	482	5.4	42.6	0.820	41.1	—	—	28	11.81
10	275	527	6.7	49.3	0.833	38.4	—	—	30	11.81
Vacuum distillation at 40 mm.										
11	200	392	4.4	53.7	0.843	36.4	40	5	30	11.84
12	225	437	4.7	58.4	0.855	34.0	48	30	32	11.84
13	250	482	5.1	63.5	0.865	32.1	61	50	34	11.85
14	275	527	4.7	68.2	0.876	30.0	95	65	36	11.88
15	300	572	6.2	74.4	0.889	27.7	150	80	39	11.87

Carbon residue of residuum, 6.0% — Carbon residue of crude, 1.7%

APPROXIMATE SUMMARY

	Per cent	Sp. gr.	°A.P.I.	Viscosity
Light gasoline	9.1	0.684	75.4	
Gasoline and naphtha	32.2	0.738	60.2	
Kerosene	10.4	0.813	42.6	
Gas oil	14.2	0.840	37.0	below 50
Non-viscous lub. dist.	9.6	0.856-0.877	33.8-29.8	50-100
Medium lub. dist.	8.0	0.877-0.896	29.8-26.4	100-200
Viscous lub. dist.	0.0			
Residuum	24.7	0.945	18.2	
Distillation loss	0.9			

[1]Correlation Index
[2]Characterization Factor

Lab. No. O-302

Oil from: Tar Springs formation
Chester (Upper Miss.) series
Depth 2551 feet

White County
Sec. 7, T. 4 S., R. 10 E.
East Centerville field

General Characteristics

Specific gravity: 0.839
Sulfur, per cent: 0.20
Saybolt Universal Viscosity (100°F): 40.0

A.P.I. Gravity: 37.2°
Color: Brown

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure — Barometer Reading 744.4 First drop, 83°F

Fraction No.	Cut at °C	Cut at °F	Per cent cut	Sum per cent	Sp. gr 60/60°F	°A P.I. 60°F	S.U. visc. 100°F	Cloud Test °F	C I.[1]	K[2]
1	50	122	3.1	3.1	0.649	86.5	—	—		
2	75	167	2.8	5.9	0.667	80.6	—	—	6.1	12.68
3	100	212	5.0	10.9	0.708	68.4	—	—	16	12.20
4	125	257	6.5	17.4	0.733	61.6	—	—	18	12.02
5	150	302	5.7	23.1	0.750	57.2	—	—	19	12.00
6	175	347	5.3	28.4	0.770	52.3	—	—	22	11.94
7	200	392	5.0	33.4	0.788	48.1	—	—	24	11.90
8	225	437	4.6	38.0	0.803	44.7	—	—	25	11.83
9	250	482	4.7	42.7	0.818	41.5	—	—	27	11.83
10	275	527	6.0	48.7	0.830	39.0	—	—	28	11.84
Vacuum distillation at 40 mm.										
11	200	392	4.8	53.5	0.840	37.0	39	below 5	29	11.89
12	225	437	4.6	58.1	0.850	35.0	45	25	30	11.91
13	250	482	4.6	62.7	0.863	32.5	58	50	33	11.88
14	275	527	4.5	67.2	0.876	30.0	90	70	36	11.88
15	300	572	5.2	72.4	0.887	28.0	130	85	38	11.90

Carbon residue of residuum, 10.2% — Carbon residue of crude, 2.9%

APPROXIMATE SUMMARY

	Per cent	Sp. gr.	°A.P.I.	Viscosity
Light gasoline	10.9	0.681	76.3	
Gasoline and naphtha	33.4	0.733	61.5	
Kerosene	9.3	0.811	43.0	
Gas oil	14.9	0.839	37.2	below 50
Non-viscous lub. dist.	8.4	0.855-0.878	34.0-29.7	50-100
Medium lub. dist.	6.4	0.878-0.893	29.7-27.0	100-200
Viscous lub. dist.	0.0			
Residuum	24.1	0.968	14.7	
Distillation loss	3.5			

[1]Correlation Index
[2]Characterization Factor

Lab. No. O-303

Oil from: McClosky "lime"
Iowa (Lower Miss.) series
Depth 3375 feet

White County
Sec. 2, T. 4 S., R. 9 E.
Centerville field

General Characteristics

Specific gravity: 0.841
Sulfur, per cent: 0.17
Saybolt Universal Viscosity (100°F): 41.0

A.P.I. Gravity: 36.8°
Color: Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure — Barometer Reading 745.2 First drop, 88°F

Fraction No.	Cut at °C	Cut at °F	Per cent cut	Sum per cent	Sp. gr. 60/60°F	°A.P.I. 60°F	S.U. visc. 100°F	Cloud Test °F	C.I.[1]	K[2]
1	50	122	2.8	2.8	0.645	87.9	—	—		
2	75	167	3.7	6.5	0.670	79.7	—	—	7.5	12.60
3	100	212	5.9	12.4	0.710	67.8	—	—	17	12.17
4	125	257	7.2	19.6	0.738	60.2	—	—	21	11.94
5	150	302	5.8	25.4	0.753	56.4	—	—	20	11.95
6	175	347	5.5	30.9	0.773	51.6	—	—	23	11.90
7	200	392	4.8	35.7	0.788	48.1	—	—	24	11.90
8	225	437	5.0	40.7	0.805	44.3	—	—	26	11.89
9	250	482	5.1	45.8	0.818	41.5	—	—	27	11.83
10	275	527	6.1	51.9	0.833	38.4	—	—	30	11.81
Vacuum distillation at 40 mm.										
11	200	392	3.7	55.6	0.840	37.0	40	10	29	11.89
12	225	437	4.4	60.0	0.850	35.0	44	30	30	11.91
13	250	482	4.5	64.5	0.860	33.0	58	50	31	11.92
14	275	527	4.7	69.2	0.873	30.6	85	65	34	11.93
15	300	572	6.0	75.2	0.887	28.0	150	80	38	11.90

Carbon residue of residuum, 5.8% — Carbon residue of crude, 1.6%

APPROXIMATE SUMMARY

	Per cent	Sp. gr.	°A.P.I.	Viscosity
Light gasoline	12.4	0.683	75.7	
Gasoline and naphtha	35.7	0.734	61.3	
Kerosene	10.1	0.812	42.8	
Gas oil	13.9	0.840	37.0	below 50
Non-viscous lub. dist.	8.4	0.854-0.876	34.2-30.0	50-100
Medium lub. dist.	7.1	0.876-0.895	30.0-26.6	100-200
Viscous lub. dist.	0.0			
Residuum	23.4	0.942	18.7	
Distillation loss	1.4			

[1]Correlation Index
[2]Characterization Factor

Lab. No. O-304

Oil from: Aux Vases formation
Chester (Upper Miss.) series
Depth 2726 feet

Franklin County
Sec. 11, T. 6 S., R. 2 E.
N. Benton field

General Characteristics

Specific gravity: 0.830
Sulfur, per cent: 0.15
Saybolt Universal Viscosity (100°F): 40.0

A.P.I. Gravity: 39.0°
Color: Dark Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure — Barometer Reading 744.3 First drop, 85°F

Fraction No.	Cut at °C	Cut at °F	Per cent cut	Sum per cent	Sp. gr. 60/60°F	°A.P.I. 60°F	S.U. visc. 100°F	Cloud Test °F	C.I.[1]	K[2]
1	50	122	3.1	3.1	0.648	86.9	—	—		
2	75	167	3.3	6.4	0.664	81.6	—	—	4.6	12.75
3	100	212	5.1	11.5	0.710	67.8	—	—	17	12.17
4	125	257	6.4	17.9	0.733	61.6	—	—	18	12.02
5	150	302	5.8	23.7	0.750	57.2	—	—	19	12.00
6	175	347	5.6	29.3	0.769	52.5	—	—	21	11.95
7	200	392	5.0	34.3	0.785	48.8	—	—	23	11.94
8	225	437	4.8	39.1	0.799	45.6	—	—	24	11.90
9	250	482	5.2	44.3	0.813	42.6	—	—	25	11.90
10	275	527	6.0	50.3	0.825	40.0	—	—	26	11.91
Vacuum distillation at 40 mm.										
11	200	392	4.8	55.1	0.835	38.0	39	10	27	11.96
12	225	437	5.0	60.1	0.848	35.4	45	30	29	11.94
13	250	482	4.5	64.6	0.858	33.4	57	50	30	11.96
14	275	527	4.9	69.5	0.871	31.0	80	70	33	11.96
15	300	572	6.1	75.6	0.885	28.4	140	85	37	11.93

Carbon residue of residuum, 7.5% — Carbon residue of crude, 2.0%

APPROXIMATE SUMMARY

	Per cent	Sp. gr.	°A.P.I.	Viscosity
Light gasoline	11.5	0.680	76.6	
Gasoline and naphtha	34.3	0.732	61.8	
Kerosene	16.0	0.813	42.6	
Gas oil	9.3	0.841	36.8	below 50
Non-viscous lub. dist.	9.3	0.852-0.876	34.6-30.0	50-100
Medium lub. dist.	6.7	0.876-0.893	30.0-27.0	100-200
Viscous lub. dist.	0.0			
Residuum	22.2	0.950	17.5	
Distillation loss	2.2			

[1]Correlation Index
[2]Characterization Factor

Lab. No. O-305

Oil from: Rosiclare member
Iowa (Lower Miss.) series
Depth 2794 feet

Franklin County
Sec. 11, T. 6 S., R. 2 E.
N. Benton field

General Characteristics

Specific gravity: 0.833
Sulfur, per cent: 0.15
Saybolt Universal Viscosity (100°F): 40.0

A.P.I. Gravity: 38.4°
Color: Dark Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure — Barometer Reading 745.2 First drop, 84°F

Fraction No.	Cut at °C	Cut at °F	Per cent cut	Sum per cent	Sp. gr. 60/60°F	°A.P.I. 60°F	S.U. visc. 100°F	Cloud Test °F	C.I.[1]	K[2]
1	50	122	3.5	3.5	0.648	86.9	—	—		
2	75	167	2.9	6.4	0.663	81.9	—	—	4.2	12.77
3	100	212	4.9	11.3	0.709	68.1	—	—	16	12.19
4	125	257	6.7	18.0	0.734	61.3	—	—	19	12.00
5	150	302	5.6	23.6	0.750	57.2	—	—	19	12.00
6	175	347	5.2	28.8	0.770	52.3	—	—	22	11.94
7	200	392	5.1	33.9	0.788	48.1	—	—	24	11.90
8	225	437	4.6	38.5	0.805	44.3	—	—	26	11.80
9	250	482	4.9	43.4	0.820	41.1	—	—	28	11.81
10	275	527	6.1	49.5	0.832	38.6	—	—	29	11.82
Vacuum distillation at 40 mm.										
11	200	392	4.2	53.7	0.840	37.0	40	10	29	11.89
12	225	437	4.5	58.2	0.850	35.0	45	30	30	11.91
13	250	482	4.4	62.6	0.860	33.0	57	50	31	11.92
14	275	527	4.8	67.4	0.873	30.6	85	65	34	11.93
15	300	572	6.4	73.8	0.887	28.0	160	80	38	11.90

Carbon residue of residuum, 8.1% — Carbon residue of crude, 2.2%

APPROXIMATE SUMMARY

	Per cent	Sp. gr.	°A.P.I.	Viscosity
Light gasoline	11.3	0.678	77.2	
Gasoline and naphtha	33.9	0.732	61.8	
Kerosene	9.5	0.813	42.6	
Gas oil	14.4	0.839	37.2	below 50
Non-viscous lub. dist.	8.3	0.854-0.876	34.2-30.0	50-100
Medium lub. dist.	7.4	0.876-0.894	30.0-26.8	100-200
Viscous lub. dist.	0.3	0.894-0.895	26.8-26.6	above 200
Residuum	23.2	0.948	17.8	
Distillation loss	3.0			

[1]Correlation Index
[2]Characterization Factor

Lab. No. O-306

Oil from: Levias member
Iowa (Lower Miss.) series
Depth 2772 feet

Franklin County
Sec. 11, T. 6 S., R. 2 E.
N. Benton field

General Characteristics

Specific gravity: 0.838
Sulfur, per cent: 0.17
Saybolt Universal Viscosity (100°F): 43.0

A.P.I. Gravity: 37.4°
Color: Dark Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure — Barometer Reading 736.3 First drop, 88°F

Fraction No.	Cut at °C	Cut at °F	Per cent cut	Sum per cent	Sp. gr. 60/60°F	°A.P.I. 60°F	S.U. visc. 100°F	Cloud Test °F	C.I.[1]	K[2]
1	50	122	2.4	2.4	0.645	87.9	—	—		
2	75	167	3.0	5.4	0.663	81.9	—	—	4.2	12.77
3	100	212	4.9	10.3	0.712	67.2	—	—	18	12.14
4	125	257	5.8	16.1	0.736	60.8	—	—	20	11.97
5	150	302	5.0	21.1	0.756	55.7	—	—	22	11.90
6	175	347	4.9	26 0	0.776	50.9	—	—	24	11.85
7	200	392	4.7	30.7	0.791	47.4	—	—	25	11.86
8	225	437	5.1	35.8	0.805	44.3	—	—	26	11.80
9	250	482	5.4	41.2	0.819	41.3	—	—	28	11 82
10	275	527	6.4	47.6	0.832	38.6	—	—	29	11.82
Vacuum distillation at 40 mm.										
11	200	392	2.8	50.4	0.842	36.6	39	5	30	11.86
12	225	437	4.6	55.0	0.852	34.6	44	25	31	11.88
13	250	482	5.6	60.6	0.863	32.5	57	45	33	11.88
14	275	527	5.7	66.3	0.873	30.6	90	65	34	11.93
15	300	572	6.1	72.4	0.885	28.4	150	75	37	11.93

Carbon residue of residuum, 8.5% — Carbon residue of crude, 2.4%

APPROXIMATE SUMMARY

	Per cent	Sp. gr.	°A.P.I.	Viscosity
Light gasoline	10.3	0.682	76 0	
Gasoline and naphtha	30.7	0.736	60.8	
Kerosene	10.5	0.812	42.8	
Gas oil	13.9	0.841	36.8	below 50
Non-viscous lub. dist.	9.4	0.857-0.875	33.6-30.2	50-100
Medium lub. dist.	7.9	0.875-0.891	30.2-27.3	100-200
Viscous lub. dist.	0.0			
Residuum	25.6	0.946	18.1	
Distillation loss	2.0			

[1]Correlation Index
[2]Characterization Factor

Lab. No. O-307

Oil from: Bethel formation
Chester (Upper Miss.) series
Depth 2623 feet

Franklin County
Sec. 1, T. 6 S., R. 2 E.
N. Benton field

General Characteristics

Specific gravity: 0.833
Sulfur, per cent: 0.15
Saybolt Universal Viscosity (100°F): 40.0

A.P.I. Gravity: 38.4°
Color: Brown

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure — Barometer Reading 735.4 First drop, 87°F

Fraction No.	Cut at °C	Cut at °F	Per cent cut	Sum per cent	Sp. gr. 60/60°F	°A.P.I. 60°F	S.U. visc. 100°F	Cloud Test °F	C.I.[1]	K[2]
1	50	122	4.0	4.0	0.652	85.5	—	—		
2	75	167	3.1	7.1	0.664	81.6	—	—	4.6	12.75
3	100	212	4.3	11.4	0.709	68.1	—	—	16	12.19
4	125	257	6.9	18.3	0.737	60.5	—	—	20	11.96
5	150	302	6.0	24.3	0.753	56.4	—	—	20	11.95
6	175	347	5.5	29.8	0.770	52.3	—	—	22	11.94
7	200	392	4.8	34.6	0.788	48.1	—	—	24	11.90
8	225	437	5.5	40.1	0.803	44.7	—	—	25	11.83
9	250	482	5.0	45.1	0.819	41.3	—	—	28	11.82
10	275	527	6.2	51.3	0.832	38.6	—	—	29	11.82
Vacuum distillation at 40 mm.										
11	200	392	4.0	55.3	0.842	36.6	40	10	30	11.86
12	225	437	4.4	59.7	0.853	34.4	46	30	31	11.87
13	250	482	4.6	64.3	0.863	32.5	61	50	33	11.88
14	275	527	4.6	68.9	0.873	30.6	88	65	34	11.93
15	300	572	5.7	74.6	0.885	28.4	150	80	37	11.93

Carbon residue of residuum, 12.1% — Carbon residue of crude, 3.3%

APPROXIMATE SUMMARY

	Per cent	Sp. gr.	°A.P.I.	Viscosity
Light gasoline	11.4	0.677	77.5	
Gasoline and naphtha	34.6	0.732	61.8	
Kerosene	10.5	0.811	43.0	
Gas oil	13.6	0.840	37.0	below 50
Non-viscous lub. dist.	8.9	0.856-0.875	33.8-30.2	50-100
Medium lub. dist.	7.0	0.875-0.891	30.2-27.3	100-200
Viscous lub. dist.	0.0			
Residuum	23.8	0.965	15.1	
Distillation loss	1.6			

[1]Correlation Index
[2]Characterization Factor

Lab. No. O-308

Oil from: Bethel formation
Chester (Upper Miss.) series
Depth 1909 feet

Fayette County
Sec. 30, T. 5 N., R. 3 E.
St. Paul field

General Characteristics

Specific gravity: 0.859
Sulfur, per cent: 0.21
Saybolt Universal Viscosity (100 F): 52.0

A.P.I. Gravity: 33.2°
Color: Brown

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure — Barometer Reading 739.6 First drop, 105°F

Fraction No.	Cut at °C	Cut at °F	Per cent cut	Sum per cent	Sp. gr. 60/60°F	°A.P.I. 60°F	S.U. visc. 100°F	Cloud Test °F	C.I.[1]	K[2]
1	50	122	0.6	0.6						
2	75	167	2.3	2.9	0.667	80.6	—	—	6.1	12.68
3	100	212	3.6	6.5	0.707	68.6	—	—	15	12.22
4	125	257	5.8	12.3	0.733	61.6	—	—	18	12.02
5	150	302	4.9	17.2	0.753	56.4	—	—	20	11.95
6	175	347	4.8	22.0	0.773	51.6	—	—	23	11.90
7	200	392	4.5	26.5	0.788	48.1	—	—	24	11.90
8	225	437	4.8	31.3	0.800	45.4	—	—	24	11.89
9	250	482	5.5	36.8	0.815	42.1	—	—	26	11.87
10	275	527	6.5	43.3	0.833	38.4	—	—	30	11.81
Vacuum distillation at 40 mm.										
11	200	392	3.7	47.0	0.843	36.4	40	10	30	11 84
12	225	437	5.0	52.0	0.853	34.4	45	25	31	11.87
13	250	482	5.1	57.1	0.863	32.5	57	45	33	11.88
14	275	527	5.6	62.7	0.873	30.6	90	65	34	11.93
15	300	572	8.1	70.8	0.885	28.4	155	80	37	11.93

Carbon residue of residuum, 12.3% — Carbon residue of crude, 3.9%

APPROXIMATE SUMMARY

	Per cent	Sp. gr.	°A.P.I.	Viscosity
Light gasoline	6.5	0.689	73.9	
Gasoline and naphtha	26.5	0.743	59.0	
Kerosene	10.3	0.808	43.6	
Gas oil	14.8	0.841	36.8	below 50
Non-viscous lub. dist.	9.4	0.857-0.875	33.6-30.2	50-100
Medium lub. dist.	9.8	0.875-0.892	30.2-27.1	100-200
Viscous lub. dist.	0.0			
Residuum	28.0	0.967	14.8	
Distillation loss	1.2			

[1]Correlation Index
[2]Characterization Factor

Lab. No. O-310

Oil from: Bethel formation
Chester (Upper Miss.) series
Depth 1441 feet

Clinton County
Sec. 14, T. 1 N., R. 1 W.
West Centralia field

General Characteristics

Specific gravity: 0.836
Sulfur, per cent: 0.17
Saybolt Universal Viscosity (100°F): 41.0

A.P.I. Gravity: 37.8°
Color: Dark Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure — Barometer Reading 744.3 First drop, 90°F

Fraction No.	Cut at °C	Cut at °F	Per cent cut	Sum per cent	Sp. gr. 60/60°F	°A.P.I. 60°F	S.U. visc. 100°F	Cloud Test °F	C.I.[1]	K[2]
1	50	122	4.0	4.0	0.640	89.6	—	—		
2	75	167	2.9	6.9	0.663	81.9	—	—	4.2	12.77
3	100	212	5.5	12.4	0.705	69.2	—	—	14	12.26
4	125	257	6.4	18.8	0.733	61.6	—	—	18	12.02
5	150	302	5.7	24.5	0.752	56.7	—	—	20	11.97
6	175	347	5.5	30 0	0.772	51.8	—	—	23	11.91
7	200	392	5.0	35.0	0.789	47.8	—	—	24	11.88
8	225	437	5.1	40.1	0.802	44.9	—	—	25	11.85
9	250	482	5.0	45.1	0.816	41.9	—	—	26	11.86
10	275	527	6.6	51.7	0.831	38.8	—	—	29	11.83
Vacuum distillation at 40 mm.										
11	200	392	3.4	55.1	0.843	36.4	40	10	30	11.84
12	225	437	4.8	59.9	0.852	34.6	45	25	31	11.88
13	250	482	4.6	64.5	0.863	32.5	59	45	33	11.88
14	275	527	5.8	70.3	0.873	30.6	84	65	34	11.93
15	300	572	5.3	75.6	0.887	28.0	155	80	38	11.90

Carbon residue of residuum, 9.9% — Carbon residue of crude, 2.7%

APPROXIMATE SUMMARY

	Per cent	Sp. gr.	°A.P.I.	Viscosity
Light gasoline	12.4	0.674	78.4	
Gasoline and naphtha	35.0	0.729	62.6	
Kerosene	10.1	0.809	43.4	
Gas oil	14.1	0.840	37.0	below 50
Non-viscous lub. dist.	9.5	0.856-0.876	33.8-30.0	50-100
Medium lub. dist.	6.9	0.876-0.893	30.0-27.0	100-200
Viscous lub. dist.	0 0			
Residuum	23.3	0.964	15.3	
Distillation loss	1.1			

[1]Correlation Index
[2]Characterization Factor

Lab. No. O-311

Oil from: Rosiclare member
Iowa (Lower Miss.) series
Depth 2101 feet

Marion County
Sec. 36, T. 4 N., R. 2 E.
Alma field

General Characteristics

Specific gravity: 0.844
Sulfur, per cent: 0.26
Saybolt Universal Viscosity (100°F): 44.0

A.P.I. Gravity: 36.2°
Color: Dark Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure — Barometer Reading 746.0 First drop, 94°F

Fraction No.	Cut at °C	Cut at °F	Per cent cut	Sum per cent	Sp. gr. 60/60°F	°A.P.I. 60°F	S.U. visc. 100°F	Cloud Test °F	C.I.[1]	K[2]
1	50	122	2.6	2.6	0.653	85.2	—	—		
2	75	167	3.9	6.5	0.663	81.9	—	—	4.2	12.77
3	100	212	3.6	10.1	0.708	68.4	—	—	16	12.20
4	125	257	5.8	15.9	0.728	62.9	—	—	16	12.11
5	150	302	5.1	21.0	0.748	57.7	—	—	18	12.03
6	175	347	5.5	26.5	0.765	53.5	—	—	19	12.01
7	200	392	4.5	31.0	0.783	49.2	—	—	22	11.96
8	225	437	4.9	35.9	0.797	46.0	—	—	23	11.93
9	250	482	5.0	40.9	0.810	43.2	—	—	23	11.94
10	275	527	6.7	47.6	0.827	39.6	—	—	27	11.88
Vacuum distillation at 40 mm.										
11	200	392	3.9	51.5	0.839	37.2	40	10	28	11.90
12	225	437	5.1	56.6	0.847	35.6	46	30	28	11.96
13	250	482	4.8	61.4	0.858	33.4	58	50	30	11.96
14	275	527	6.4	67.8	0.873	30.6	86	70	34	11.93
15	300	572	8.1	75.9	0.885	28.4	175	85	37	11.93

Carbon residue of residuum, 11.0% — Carbon residue of crude, 2.8%

APPROXIMATE SUMMARY

	Per cent	Sp. gr.	°A.P.I.	Viscosity
Light gasoline	10.1	0.676	77.8	
Gasoline and naphtha	31.0	0.729	62.6	
Kerosene	9.9	0.804	44.5	
Gas oil	14.8	0.836	37.8	below 50
Non-viscous lub. dist.	10.2	0.851-0.875	34.8-30.2	50-100
Medium lub. dist.	8.0	0.875-0.888	30.2-27.9	100-200
Viscous lub. dist.	2.0	0.888-0.892	27.9-27.1	above 200
Residuum	22.2	0.968	14.7	
Distillation loss	1.9			

[1]Correlation Index
[2]Characterization Factor

Lab. No. O-319

Oil from: Tar Springs formation
Chester (Upper Miss.) series
Depth 1932 feet

Gallatin County
Sec. 4, T. 8 S., R. 8 E.
Omaha field

General Characteristics

Specific gravity: 0.893
Sulfur, per cent: 0.24
Saybolt Universal Viscosity (100°F): 102.0

A.P.I. Gravity: 27.0°
Color: Dark Green

DISTILLATION, BUREAU OF MINES HEMPEL METHOD

Distillation Atmos. Pressure — Barometer Reading 747.5 First drop, 169°F

Fraction No.	Cut at °C	Cut at °F	Per cent cut	Sum per cent	Sp. gr. 60/60°F	°A.P.I. 60°F	S.U. visc. 100°F	Cloud Test °F	C.I.[1]	K[2]
1	50	122								
2	75	167								
3	100	212	3.2	3.2	0.762	54.2	—	—	41	11.30
4	125	257	2.4	5.6	0.763	54.0	—	—	33	11.56
5	150	302	2.5	8.1	0.782	49.5	—	—	34	11.51
6	175	347	2.7	10.8	0.804	44.5	—	—	38	11.42
7	200	392	3.1	13.9	0.824	40.2	—	—	41	11.37
8	225	437	3.9	17.8	0.839	37.2	—	—	42	11.33
9	250	482	4.9	22.7	0.853	34.4	—	—	44	11.36
10	275	527	7.5	30.2	0.860	33.0	—	—	42	11.44
Vacuum distillation at 40 mm.										
11	200	392	2.6	32.8	0.866	31.9	41	below 5	41	11.54
12	225	437	5.3	38.1	0.874	30.4	50	below 5	41	11.59
13	250	482	5.4	43.5	0.880	29.3	65	10	41	11.66
14	275	527	6.5	50.0	0.889	27.7	98	40	42	11.71
15	300	572	7.4	57.4	0.900	25.7	185	65	44	11.72

Carbon residue of residuum, 7.3% — Carbon residue of crude, 3.1%

APPROXIMATE SUMMARY

	Per cent	Sp. gr.	°A.P.I.	Viscosity
Light gasoline	3.2	0.762	54.2	
Gasoline and naphtha	13.9	0.788	48.1	
Kerosene	0.0			
Gas oil	21.6	0.857	33.6	below 50
Non-viscous lub. dist.	11.5	0.874-0.889	30.4-27.7	50-100
Medium lub. dist.	7.9	0.889-0.902	27.7-25.4	100-200
Viscous lub. dist.	2.5	0.902-0.906	25.4-24.7	above 200
Residuum	40.6	0.944	18.4	
Distillation loss	2.0			

[1]Correlation Index
[2]Characterization Factor

Illinois State Geological Survey
Report of Investigations No. 88
1942